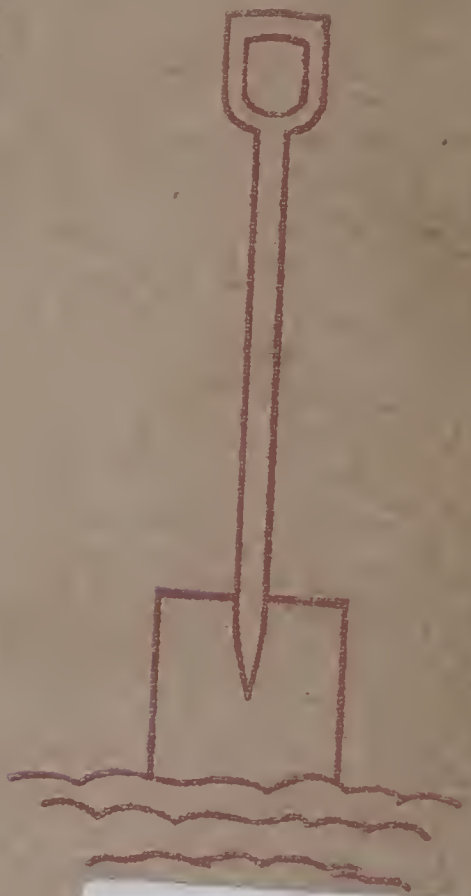

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GROW YOUR OWN VEGETABLES

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By PAUL W. DEMPSEY

WITH ILLUSTRATIONS

NEW EDITION
WITH
THE TWENTY-MINUTE-A-DAY GARDEN
By ALBERT C. BURRAGE

HOUGHTON MIFFLIN COMPANY · BOSTON

The Riverside Press Cambridge

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The Twenty-Minute-a-Day Garden, by Albert C. Burrage, Jr.

CHAPTER

I

WHY A VEGETABLE GARDEN?

The vegetable garden of the past was a 'kitchen' garden — with the accent on the kitchen. It was a 'feast or famine' garden — with one planting of beans, one planting of early beets, and one planting of late beets, a few hills of corn, and not much else. A vegetable graced the table every day for a few weeks until all the family were sick of it, and then no more was served until winter, when the canned product was brought up from the storage closet. Unsightly bare spots were left in the garden, and sooner or later they became patches of weeds or places to dump the refuse for a future bonfire. Today, with a limited area, the modern gardener keeps every square foot working all the time. By successive plantings, the table is kept supplied continuously with young tender vegetables and the garden is maintained in a tidy and productive condition.

Possibly you have heard it said that a vegetable garden is not beautiful. Many people evidently think this is true, for they plant their vegetables behind the garage, or build a fence or perhaps plant a hedge to hide this part of their garden from the public view. I am glad to say that this old-fashioned idea is going the way of many other similar old-fashioned ideas. Certainly a vegetable garden, with its even rows of plants of various sizes and different shades of green, is 'a thing of beauty and a joy forever.' With the proper planting and care, a vegetable garden can be made and kept attractive throughout the season. This is one of the main reasons for this book.

A vegetable garden can become a distinct asset to any family that has the space and the inclination. There is a thrill in the gathering, preparation, and eating of home-grown vegetables that provides a tonic in addition to their great food value, and in times of stress and economic pressure the advantages of 'growing your own' are manifest. The space may actually be a little two-by-four back-door plot, or it may be a real

back-yard garden of an acre or more. The work required may be limited to a few minutes now and then, or take all the hours one can spare from his regular work. Once started, I am sure the average gardener will want to increase his vegetable garden space if it is at all possible, and he will not readily give it up.

Growing vegetables can be of particular value to the worker confined to office, store, or factory. Even the busy housewife will find that a few minutes spent in the garden renews her spirit and provides her with a much-needed change from the humdrum of household duties. Never yet did the good earth disappoint the earnest and well-advised gardener. Starting with the stimulating experience of poring over the seed catalogues, there will be busy days and weeks of planning filled with the pleasure of anticipation, which the philosophers tell us exceeds that of realization. Some members of the family will find as great recreation and exploit of skill in their garden plot as they do on the golf links. And yet a good hoe and rake and the best of seed cost but a very small fraction of the amount required for clubs, balls, and dues. What is a 'hole in one' compared with the satisfaction of leaning over the garden fence and nonchalantly saying, 'We had our first mess of peas tonight. I see yours won't be ready for several days'? Certainly in these busy times everyone needs a complete change of work and thought to keep his body and mind healthy. What better place to find these things than in your own back yard?

The great value of *fresh* vegetables in the diet is now universally recognized. Vitamins in capsules may be satisfactory, but vitamins in fresh vegetables are better because in addition you get essential minerals, important bulk, and the appetizing quality that variety and bright colors give to a dinner plate. The vegetable garden will do its full share in providing this color — green and yellow string beans, red beets, red and yellow tomatoes, orange carrots, for instance. These and many others can be easily grown in a small area in your back yard. Surely, this alone is sufficient justification for planting a vegetable garden. Ten minutes from garden to table for those vegetables eaten raw; thirty minutes or less for many of those that must be cooked. Farther along there is a chapter that tells you (or the cook) how best to prepare the vegetables from your garden.

If you were to figure the cost of your back-yard garden and find that you had spent more than the vegetables would have cost at the store,

would you consider the garden a failure? I have asked this very question of some of my garden-minded friends and have received some most interesting answers. Some admit that their vegetable patch is an expensive hobby, but without exception argue that it is more than worth it. Most of the gardeners, however, can show me in detail just how much money they save and, in addition, they list the other benefits derived from their hobby.

I want to add my personal testimony on the value of a vegetable garden. For twenty-five years my business has been closely connected with the production of vegetables; the first fifteen years I had charge of much of the actual work of growing the vegetables at the Waltham Field Station of the Massachusetts State College. During this time I personally planted practically all the seed sown. For the past ten years as Station Horticulturist I have spent most of my time there telling others how to grow vegetables. In spite of this, my hobby has been my vegetable garden, and it has performed a very important function in our family of eight. It is not an unusual sight to see a group of us all working together. A row of flowers has particular appeal for one; a bed of Everbearing strawberries attracts another; a row of gourds (this has grown to four rows and threatens to engulf the whole garden) particularly interests others. We all get out and work together — get better acquainted — and find a place where, through primitive labor, we gain relief from the strain civilization has forced upon us.

CHAPTER

II

PLANNING AND PREPARING THE GARDEN—AND A FEW FUNDAMENTALS

Now is the time to *plan* your vegetable garden. You can have a lot of fun making up your mind what you are going to grow and when and how much of each vegetable you want. In most sections of the country, you can do the actual work of planting between April 15 and July 4.

Location

Most of you will not have a great deal of choice in selecting the site of your vegetable garden. It will be necessary for you to use the only spot that is available and make the best of the conditions as you find them. It adds to the enjoyment of success if you have to garden under a handicap.

The location of the garden for convenience, both in caring for the crops and in gathering the vegetables, is of great importance. The garden must be handy, not only to make it possible to run out and pick fresh vegetables for dinner, but to make it convenient and profitable to spend a few minutes weeding and thinning, in between other tasks around the house. The garden should be as near the house as possible, even if the soil and the lay of the land may not be too satisfactory.

Sunlight is a vital factor in the production of vegetables, and for this reason the garden should be situated where it will receive full sunshine all day. Certain crops may stand more shade than others, but all vegetables will suffer somewhat from the least amount of shade. Trees and large shrubs not only compete with the plants for sunlight, but draw heavily upon the moisture and fertility of the soil. We seldom realize just how far roots from vigorous shrubs and trees will go in their search for vital water and food. Where the soil is thoroughly dug up every year for vegetables, we can to a large extent replace the food, but the

tree roots in the subsoil continually sap the vitality from the area. You can easily see just how far these roots penetrate by the size and productiveness of the vegetable plants. Of course, by feeding and watering our garden we invite these foraging roots right into our cultivated area. If it is impossible to get rid of this competition entirely, you can correct matters to a certain degree by making occasional applications of extra food and using more water during dry spells. As for the shade, it is sometimes possible to help matters by a little judicious pruning.

Growing vegetables do not like wet feet, so, if you have heavy, wet soil, it means that the garden cannot be planted very early and also that in times of heavy rains the plant roots may be in a saturated soil. The garden should also be free from depressions in which water might stand for several hours after a heavy rain. Sometimes a few feet of drain pipe will correct this condition. Certainly it is worth while investing a little money in such an improvement that will affect conditions for years to come. If nothing can be done about a damp soil, you can help by planting your vegetables on raised beds from two to eight feet wide and four to twelve inches high.

The slope of the land influences the time of planting a garden as well as the manner of making the rows. It also will make it advisable to plan the garden to fit the slope. A garden with a southern exposure will be ready to plant a week or more ahead of one on the north side of the hill. If the pitch is sufficient to cause washing during a heavy shower, it will be best to plant the rows across the slope. Crops such as tomatoes and beans will do better on the higher, drier section than cabbage and lettuce.

If the only available place for your garden is near large trees, you can make a barrier that will keep most of the roots out. Dig a narrow trench about two and a half feet deep at the edge of the garden and put in a strip of zinc or galvanized iron, or make a concrete or board wall.

Have your nextdoor neighbors any dogs, chickens, or children? Then it may be worth while to put up a fence of some sort around your plot. If a garden is near the home, a closer watch can be kept over the area, but a fence will often save a lot of trouble.

Vegetables are more than ninety per cent water. Seldom do we have a season but what we suffer from lack of moisture during two or more dry spells. Unless your garden is in a moist location or the soil is heavy,

it is difficult to give it too much water. If a supply of water is near the garden, you will be more likely to use it when it is needed.

The nature of the soil and subsoil in your vegetable garden is of the greatest importance. Few back-yard gardeners can hope to find an ideal vegetable soil in their garden area. Many of you may become discouraged at what you find when you start to dig around a little. Most garden experts frighten an amateur by suggesting that a 'good deep, sandy loam' is the first and most important requisite to a successful garden. I admit that the type of soil and subsoil you have is important, but only in so far as it determines what you should do before you can grow good vegetables year after year. I have seen so many gardeners work miracles in an apparently hopeless soil situation that I now say, 'Go to it!' to all who seek my advice.

Size

Some of you will not have any trouble deciding just how big a garden you want to tackle, for the question has already been decided for you by the limits of your property. I cannot tell you how much of a garden to plant at first, because there are so many conditions that will influence the decision.

Here are some of the factors that you should take into consideration before making up your mind:

1. How much time are you going to be able, or willing, to spend in taking care of the garden? Most gardeners — yes, this includes commercial growers, professionals (private estate), and amateurs — plant more than they can properly care for. There is something about planting a garden that makes every one of us forget the troubles of the preceding season. We want to plant this and that and put in some of this other crop — it is a disease that attacks most gardeners, a very real garden fever. It is so much fun and so easy to sow seed and set plants; it will get you if you don't watch out — especially if it is early spring. Then, when the warm weather comes, just when the weeds and bugs are at their worst, somehow or other the fever has left us and working in the garden becomes drudgery instead of pleasure. It is because of this that I warn you to start gardening in a small way. Then, with a year's experience to judge by, you will know just how large a garden you can take care of without its becoming a burden. So, do not be too ambitious. I suggest you try half the area you would like to start with.

2. How much help are you going to get from others? Are you going to get any assistance from your wife and children? Have you a hired man, and can you get extra labor from time to time? It will make quite a difference in determining the size of your garden at the outset and the possibility of later enlarging it.

3. What is the condition of the soil in the area you intend to grow your vegetables? If it has already been worked for several years, it is going to make the work easy. On the other hand, if the garden is full of witch grass, it means that much extra work will be required for a year or two to get rid of it. Or if the soil is clayey, sandy, rocky, full of roots, or otherwise in poor condition, it will require much more work to prepare and take care of the same area.

4. Is the garden going to be 'just another thing,' or are you going to make it one of the important endeavors of the summer?

5. Will it be possible to get help to plow and harrow the garden, and perhaps even cultivate it with horse or motor cultivator, at frequent intervals during the season?

6. Do you plan to go away for part of the summer?

These and other considerations will have a bearing on the best size of garden for you to plant

The Crops to Grow

'What vegetables shall I grow in my garden?' This is a question frequently asked, and one that I hesitate to decide for another person. Here again, a year's experience will teach you a lot. Do you prefer to concentrate on crops that will grow best under your conditions — on the vegetables that you like to eat best — or on those that are best for you to eat? I suggest that a compromise be made, with special emphasis on the vegetables you particularly like. I also suggest that the family be consulted and given a voice in the selection. If your space is limited, it may be that you should concentrate on those vegetables that quickly deteriorate in quality.

Although I realize that every family will have different ideas on the subject, I suggest the following list of vegetables for your consideration. From my experience and observation, the crops are given in the order of their value for yielding the most produce from the area they occupy, their ease of growing under average conditions, and their food value.

1. Tomatoes
2. Snap beans — pole and bush
3. Carrots
4. Beets
5. Cabbage
6. Swiss chard
7. New Zealand spinach
8. Lettuce
9. Peas
10. Sweet corn
11. Lima beans
12. Onions
13. Potatoes
14. Asparagus
15. Cauliflower
16. Summer squash

Other crops frequently grown are:

Broccoli
Celery
Chinese cabbage
Cucumbers
Eggplant
Endive
Horticultural beans
Kohlrabi
Melons
Parsnip
Peppers
Pumpkin
Radish
Rhubarb
Spinach
Winter squash

These vegetables are less often grown in the home garden:

Brussels sprouts
Celeriac
Herb row
Kale
Leeks
Mustard
Okra
Salsify
Watermelon

Vegetable Varieties. If you have ever examined a seed catalogue, you are undoubtedly well aware that there are a number of named varieties of most of the vegetables, fruits, and flowers offered. As a rule, you will find that the more popular the vegetable, the more varieties there are listed. Unfortunately, owing to the indiscriminate use of adjectives, the seedsman does not give you much help in the selection of the best variety for your garden. Over a period of years, the varieties which prove most satisfactory under varying conditions and in different places become 'standard.' The demand for seed of these varieties often exceeds that for all others combined. Seedsmen naturally respond to this demand by concentrating their energy to produce even better strains of these 'standards.' If you compare the lists of vegetable varieties recommended by the various state colleges throughout the country, you will find a great similarity in spite of considerable variation in growing conditions. The

standard' varieties are more or less universally grown and it takes an exceptionally good new variety to supersede them. Most state colleges now issue a list of 'Recommended Varieties of Vegetables' each spring. This is based on extensive trials conducted in practically every state, and usually includes a description of promising new varieties worth trying. Before you make out your seed order, be sure to get the latest list.

Seedsmen still carry many of the old poor-quality varieties because a surprisingly large number of their customers are gardening just as their fathers gardened and demand the same old familiar thing. The majority of back-yard gardeners and not a few commercial growers in supposedly progressive states are just about twenty-five years behind the times in the methods they use and the varieties they grow.

A large number of plant breeders are employed by experiment stations and seed growers to devote their entire energies to the development of better strains. Each season sees the result of years of experimentation. This means that in order to keep your garden up-to-date you should keep in close touch with your state college. The little effort required to do this will well repay you. Appendix C gives the locations of the various colleges, so you have no excuse to offer if you do not take advantage of their services, which are rendered free of charge.

If you are a novice, select a 'standard' for growing in quantity. Then if you have the room and the inclination to do a little experimenting, try out on a small scale a new variety or two suggested by your neighbor gardeners or your seedsman. In this way you can determine for yourself just how the different varieties perform in your garden. If sufficiently interested, visit your state college during the growing season to look over the large number of variety trials under way. Many of our state experiment stations have 'field days' when growers are invited to come and see the experiments in progress and, at the same time, swap experiences and examine the latest in garden tools.

For the home garden, it is important to make your selection on the basis of quality. For example, most lists recommend Golden Acre as the best early cabbage and Danish Ballhead as the best late. I suggest that you plant Golden Acre *throughout the season* because of its superior quality. Certainly there is no good reason for planting inferior strains when the better ones require no more space and are just as easy to grow.

Here is a compressed list of 'standard' home-garden varieties:

Vegetable	*Variety*
Asparagus	Mary Washington
Beans:	
Dwarf	
Green	Tendergreen, Stringless Green Pod
Wax	Pencil Pod, Sure Crop
Pole	Kentucky Wonder
Lima	Baby Potato
Beets	Crosby's Egyptian
Cabbage	Golden Acre, Red Acre, Savoy
Carrots	Red-Cored Chantenay, Tendersweet
Cauliflower	Early Snowball
Celery	Summer Pascal
Corn — sweet	Golden Cross Bantam
Cucumbers	A & C, Davis Perfect
Lettuce	Butterhead type, White Boston, Iceberg type, Cosberg
Onions:	
From sets	Ebenezer
From plants	Sweet Spanish
From seed	Early Yellow Globe
Pea:	
Dwarf	
Early	Laxton's Progress
Midseason	Gilbo
Tall, late	Telephone
Potato	Green Mountain
Squash:	
Summer	Straightneck
Fall	Des Moines
Winter	Buttercup
Tomatoes	Early Comet
	Late Marglobe

Seed. The purchase of good vegetable seed is no longer the problem it used to be. A large proportion of the seed raised is now produced by a comparatively few seed growers. Most of these concerns are progressive and reliable. Many states have seed laws to protect the gardener. The extensive planting of trials by both experiment stations and seedsmen with the accompanying publicity quickly exposes the sources of poor seed. Less consideration is given to price and more to quality. Buy your seed from a well-known seedsman and you should find little chance for complaint. If anything goes wrong, the chances are the fault lies on your side.

Make out your seed list and order everything you think you will need as soon as possible after the catalogues arrive. Dealers have their new stocks ready at that time, and in case of a limited supply you will get what you order. Do not put off buying so long that you will eventually have to take a substitute from a local store.

Good seed costs money to produce. Do not buy cheap seed. On the other hand, do not think that high prices mean better seeds. Your state college will send you the names of several reliable seedsmen. Extra high

prices for any plant usually indicate that it is a novelty. Stick to the standard varieties until you know there is something better.

In the accompanying table on page 12 you will find the amount of seed necessary to plant one hundred feet of row. Do not buy too much extra seed. Few gardeners like to take a chance on planting last year's left-overs.

Making the Garden Plan. You should make some sort of plan of your garden before you start to plant. It will be fun, particularly on a winter evening, to look over the planting tables and decide what you are going to plant, when you can plant it, and where it should be planted, with references to the new seed catalogues as soon as they arrive.

How large is the garden to be? In order to make a satisfactory plan, you must know the approximate size of the garden area. If this is your first attempt at growing vegetables, I repeat my warning: Start with a garden half the size you would like to plant.

The proper arrangement of the crops requires a little judgment and considerable study of the planting tables. It is important to allow sufficient room for the full development of each plant. When we plant the seed and later thin the plants out, a foot seems a lot of space to allow for a head of lettuce. It seems a terrible waste to pull out tiny carrot seedlings and leave only one every three or four inches. We forget how much room a tomato plant or a hill of summer squash really takes when it is fully grown. If we do not allow sufficient room for the normal growth of all the plants, the weaker ones will suffer. On the other hand, with a limited area available, it will be a mistake to waste even a square foot.

I do not consider it important to make the rows run according to the compass, or even to arrange the crops so that the tall plants will be on the north. I also break with custom in recommending that you plant more than one kind of crop in a row. My garden is long and narrow, and when I plant the rows the long way, I often sow three or four different crops in the same row at the same time. My one idea is to have as continuous a supply of tender vegetables as possible throughout the season. These rows, composed of a few feet of each of several crops, are planted at frequent intervals up to midsummer.

If you have sufficient room and can cultivate your garden with a horse or motor cultivator, it will be necessary to make your planting plan according to the size of the cultivator. For either of these cultivators

Vegetable Table

Kind of Vegetable	Requirements for 100 ft. of Row		Inches Distance to Allow Between		Approx. No. of Days Planting Seed to		Hardy Half-Hardy Tender
	Seed	Plants	Rows	Plants	Germination	Harvest	
		(roots)					
Asparagus	1 oz.	75	42–48	15–20	10–15	3 yrs.	h
Beans							
Bush	1 lb.		24–30	2–4	4–8	40–65	t
Pole	½ lb.		30–36	24–30 hills	4–8	60–75	t
Lima, bush	1 lb.		24–30	4–6	4–8	60–75	t
Lima, pole	½ lb.		30–36	24–30 hills	4–8	75–100	t
Soy	¼ lb.		24–30	2–4	4–8	90–120	t
Beet	2 oz.		12–15	2–3	6–10	40–65	h
Broccoli		75	24–30	15–20	4–8	60–100	hh
Cabbage							
Regular		75	24–30	15–20	4–8	60–90	h
Chinese	¼ oz.		15–18	8–10	4–8	80–100	h
Carrot	½ oz.		12–15	2–3	10–15	65–100	h
Cauliflower		75	24–30	15–20	4–8	80–110	hh
Celery		200	15–30	6	12–20	100–140	hh
Chard	2 oz.		12–15	4–8	6–10	40–65	h
Corn	¼ lb.		30–36	10–12 rows 24–30 hills	6–8	65–100	t
Cucumber	½ oz.		60–72	10–12 rows 48–60 hills	6–10	80–100	t
Eggplant		50	30–36	24–30	10–15	100–140	t
Endive	½ oz.		12–15	10–12	10–12	70–90	h
Kohlrabi	¼ oz.		12–15	3–4	4–8	55–70	hh
Lettuce							
Head	¼ oz.	100	12–15	8–12	4–8	50–80	h
Cos	¼ oz.		12–15	6–8	4–8	50–80	h
Leaf	¼ oz.		12–15	2–4	4–8	30–60	h
Melon	½ oz.		60–72	10–12 rows 48–60 hills	6–10	75–100	t
Onion							
Plants		400	12–15	3–4		120	hh
Sets		2 lbs. small	12–15	3–4		60–80	hh
Seed	1 oz.		12–15	3–4	6–12	120–150	hh
Parsley	¼ oz.		12–15	4–6	12–20	80–95	h
Parsnip	½ oz.		12–18	3–4	12–20	120–150	h
Peas	1 lb.		24–36	1–2	8–12	60–90	h
Peppers		75	18–30	15–18	6–10	100–150	t
Potato	6–10 lbs.		30–36	9–12	8–12	90–120	t
Pumpkin	1 oz.		72–84	18–20 rows 60–72 hills	4–8	80–100	t
Radish	1 oz.		6–12	1–2	4–8	30–60	h
Rhubarb		35	36–42	24–36		2 yrs.	h
Rutabaga	¼ oz.		18–24	4–8	4–8	80–100	h
Spinach	1 oz.		10–15	2–3	6–10	50–65	h
New Zealand	2 oz.		24–30	10–15	8–12	65–90	t
Squash							
Bush	½ oz.		36–42	24–36	4–8	60–80	t
Vine	½ oz.		84–96	18–20 rows 72–84 hills	4–8	90–110	t
Tomato							
Staked		75	30–36	12–18	6–10	100–120	t
Flat, early		50	30–36	18–24	6–10	100–120	t
Flat, late		35	36–48	24–36	6–10	120–140	t
Turnip	¼ oz.		12–15	3–4	4–8	60–80	h

it will mean that all the rows should be at least thirty inches apart — yes, even the small crops (carrots, lettuce, and so forth).

The planting of a quick-growing crop, such as radish, lettuce, spinach, and others, between rows or even plants of slow-growing crops, such as celery, asparagus, potatoes, and so on, is called 'companion cropping.' I do not suggest you try this at first, but as the years go by you will be able to take increasing advantage of every bit of garden space. This takes careful planning and a thorough knowledge of the comparative rate of plant growth.

You must, however, take full advantage of the method of planting known as 'succession cropping.' As soon as one crop is harvested, another crop that will mature before the end of the season is planted in the same place. When the space occupied by the early beets is empty, for instance, some Cos lettuce or late carrots can be sown. You will find an opportunity to use your ingenuity to the full, and although this may not improve the general appearance of your garden, it will greatly increase the produce. If you follow my recommendations for making frequent plantings of short rows of most of the vegetables, you will have a chance to try many different successive crops.

Rotation of crops is frequently mentioned as important both in the control of pests and in the utilization of the plant foods in the soil. It is true that the continued growing of certain crops in one place will tend to intensify some pests. For example, members of the cabbage family grown in one place for several years may bring in clubfoot or root knot, a serious yet little known soil-borne disease. In this case it will be necessary to stop the growing of all members of the cabbage family for three to five years. Potato scab is another disease encouraged by growing one crop in one place year after year. Meanwhile, other crops may be successfully grown in the affected soil. In the small garden it is impossible to carry out a plan of crop rotation, especially if you follow my recommendations for several plantings of the various vegetables. You can, however, help matters by planting the rows one way for a year or two and at right angles to these rows the next year or two. In addition, you can put your all-season crops, such as tomatoes and pole beans, in a different spot each year. By furnishing sufficient food and organic matter each year, you need not worry about the effect of continuous cropping on the soil. Many gardens are still producing excellent vegetables after more than fifty years of cultivation.

Soil Preparation. In order to produce good crops of quality vegetables, the plants must be provided with a continuous supply of food and moisture. This is your main problem, and under most conditions it is not an easy one to solve.

Have your soil tested, if possible, for both soil reaction and plant-food content. To take the sample for testing, make a hole about six inches deep. Take a downward slice of the side of the hole, thus getting a representative sample of the top six inches of soil. Take or send a cupful of this to be tested. You may find out where this is done from your state college.[1]

The proper time to turn over your garden soil will depend upon conditions. I have my whole garden plowed and harrowed as early in the spring as possible. Manure and phosphate are turned under for the whole garden, but only the section I intend to plant early is fertilized before harrowing. The remainder of the garden is fertilized and then raked just before planting — as the later sowings are made. I do not recommend fall plowing unless there is a special condition making it necessary.

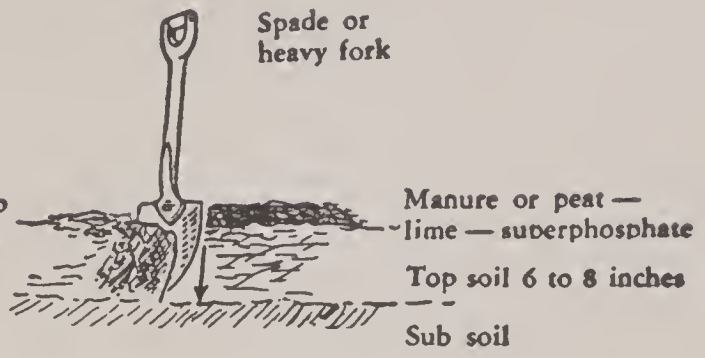
Whatever method you use to turn over your garden soil, try to get it done as thoroughly as possible. I like to get down into the subsoil just a little here and there if it is possible. In doing this I am making my topsoil a little deeper each year — from a quarter to half an inch.

If conditions are right, turn over at least seven inches of soil; better still, nine inches or more. Turn under the manure, garden trash, and cover crops so that they are completely covered. Mix in the lime and phosphate when turning over the soil, for neither is of much immediate value when applied to the soil surface. Harrow or rake in the complete fertilizer just before the seed is sown or the plants are set.

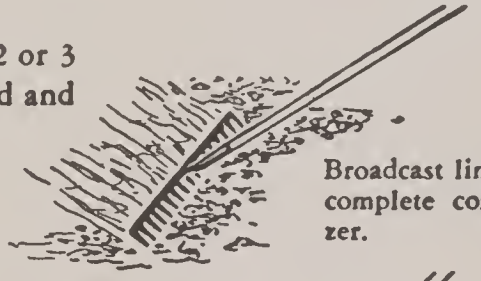
Digging is a back-breaking job, and it is not easy to find a farmer who has horses and is willing to do the work. The large farm tractors are too awkward, and the small motor cultivator will not turn over a proper furrow except when the soil is mellow and free from trash. Fortunately, there has been an entirely new tool developed during the past few years. It is a comparatively small motor-driven machine that plows, harrows, and smooths in one operation by means of a number of rotating knives. These machines are fairly expensive and have not been generally accepted by commercial growers as yet. They are so radically different in design and operation that it will take some time for prejudices to be overcome.

[1] For detailed information on soil and fertilizer see Appendix A.

Prepare the soil thoroughly

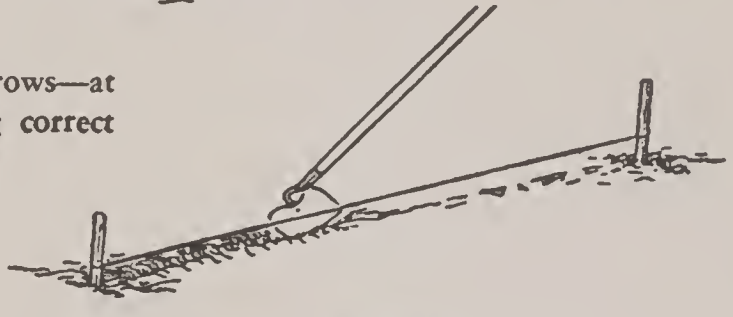


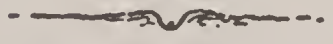
Level off and pulverize top 2 or 3 inches to make good seed bed and mix in fertilizer.



Broadcast lime if needed and complete commercial fertilizer.

Plant seeds in straight rows—at correct depth — leaving correct distance between rows.

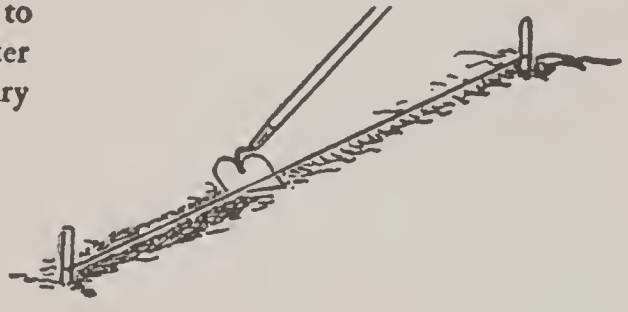




Small seeds about 1 inch deep, cover with about ½ inch of soil.

Large seeds 3 to 4 inches deep, cover with about 1 inch of soil.

Press soil firmly around seed to insure quick germination. Water if dry, particularly during dry spells.



Greenhouse growers have found these machines to be ideal for their work, and a number have been purchased by both vegetable growers and florists. There are also a number of men who have built up a profitable business doing custom plowing with this type of machine. Their rates are very reasonable; they can work in an area of any size or shape, and they are usually willing and capable of tackling the toughest kind of digging. Unless there is some coarse trash, the soil is made ready for planting seed or setting plants when the machine is through.

The possibilities of getting a satisfactory crop the first year you attempt a vegetable garden are very good. Much depends upon soil and weather conditions, but more depends on *you*. If the garden is located in a place that has not recently been cultivated, you may find yourself handicapped by a difficult soil condition, such as a shallow topsoil with a subsoil of either sand or hard clay, or the presence of a persistent weed, such as witch grass. This is one of the reasons I believe you should start with a small-sized garden. In some parts of this book I may seem to be pessimistic. It is because I want you to be prepared for the worst, but, with your gardener's enthusiasm, to expect the best.

Drainage. Few vegetables will grow well when their roots are continually in wet soil. Air is just as important as food and moisture. There is little air in a wet soil. The addition of coarse peat, strawy manure, hard-coal ashes, or even coarse sand may help in aerating the soil. Planting the crops on raised beds will also help in some gardens. If necessary, however, some sort of drainage system should be installed to take care of excess water during wet spells. An ordinary four-inch land tile, placed in a trench through the lowest part of the garden to keep the water level down, will frequently suffice.

Irrigation. It is difficult for the average gardener to realize the large quantity of water required for normal growth. To produce a pound of plant tissue, a plant must take up from 200 to 400 gallons of water. Practically all the food elements used in the complex process of growth are taken up in solution. Unless the water supply is continuous, this growth process is interrupted and the plant will not produce as much as it might have.

Although much of the area in the United States east of the Mississippi River is in the so-called 'humid' section of our country where there is theoretically a sufficient rainfall throughout the year, every gardener knows that the supply is far from constant. Seldom does a growing

season pass without more than one period of severe drouth. I believe it is safe to say that in most vegetable gardens the lack of a steady supply of water results in a greater loss than from all other causes combined.

The problem of providing this water has faced the vegetable grower since he started to cultivate plants. Man has used his utmost ingenuity to get this water to his plants with the least amount of trouble and at the lowest possible cost. Crude irrigation systems as old as civilization itself are still found in ancient lands using the same methods for growing the same crops today. It is a far cry from these to the modern watering gadgets found displayed in the average garden-equipment store; the 'Water Wand,' a rod that allows the operator to stand up while he gently floods the soil; the 'Soil Soaker,' a length of porous canvas hose which is laid down between the rows while the gardener sits on his screened porch and smokes his pipe; and the 'Automatic Oscillators' that turn any length of overhead irrigation pipe so that each side is evenly watered while the gardener takes a snooze.

Do you like to sprinkle your vegetable garden on an evening when you do not have anything special to do? Then it is about time you were told that this sprinkling business, using a hand nozzle, is just about the worst thing you could do. Water regularly, but never oftener than twice a week. When you do water — 'Soak, don't sprinkle.' Yes, this means some sort of sprinkler. Just which one you should get is a problem you will have to solve for yourself. You should consider: (1) the size of your garden; (2) the water pressure at the garden; (3) the type of soil; (4) the amount of water available; (5) the cost of the water; and (6) the size of your pocketbook. A good irrigation system is expensive, but if you are to plant your crops according to a prearranged schedule, it is a necessary item of equipment. I urge you not to delay the installation of a permanent watering system even if you must spread the cost over a period of ten or fifteen years.

To have water available when you need it makes possible more intensive cropping, hastens maturity, and increases yield and quality. It is of special value just after seeds are sown or plants are set, to insure a quick and even stand. Examine the various kinds of watering equipment in action. Talk over the costs of installing and operating, as well as the results obtained, with users and salesmen.

Tools. Just which tools you will need will depend on the size of your garden, the method of cultivation, and your particular desires. There

are no 'best' types of tools; I used to think so, and went around giving talks on 'Tools and Garden Gadgets.' The 'gadgets,' of course, were those freakish-looking things that are listed in our current magazines under the title 'What's New in the Garden.' You will find racks full of them in any up-to-date seed store. When I found that some enthusiastic gardeners found these gadgets of so much value that one of them (a different one in every case) was about the only tool they used the whole season, I decided that my ideas on the subject applied only to myself. Since then I have discovered that we become skilled in the use of almost any tool we are in the habit of using. When you do buy a tool, get a good one.

After the ground is prepared, a good iron rake will come in handy for smoothing over rough spots or raking up stones or trash.

I consider a line for making straight rows next in importance. Have it just a little longer than the longest row in your garden. Make the two stakes for the ends of the string either one or two feet long so that they can be used in measuring the distance between the rows.

For marking the exact place where seed has been planted, I use ten-inch wooden painted labels on which I write the variety, source of seed, and date of planting.

Then you will need a tool for making the furrow — I use a light hoe. This may also be used for cultivating, or you may prefer to get a wheeled cultivator or scuffle hoe for this work.

The only other tool absolutely necessary will be some kind of trowel, although I strongly advise a duster for pest control.

CHAPTER

III

TWO MODEL GARDENS

From A to Z

The following detailed plans and directions for making two small gardens — one five hundred square feet and the other one thousand square feet — are given to show how much you can really get into a small space by a little planning. I have gone into great detail with the hope that this chapter will be of much help to those who know little or nothing about the growing of vegetables. Do not be too ambitious the first year. This chapter, which is for beginners rather than oldtimers, has been the hardest for me to write, for it is not easy to plan a garden for someone else. I have tried to make it as simple as possible. You should be able to improve on the plan the second year, particularly if you keep a garden diary. For one thing, you can replace the vegetables that you do not like or that do not do well.

The directions must be followed closely; if any substitution is made, be sure that the crops require the same space between the rows. I have allowed fifteen inches between the rows of the smaller crops. This is none too much where the growing conditions are good. If your soil conditions are only fair the foliage will not be as heavy and you can make the rows twelve inches apart. This can easily be done by using the row number for the number of feet from the edge and then ignoring the footage as shown. If you do use the twelve-inch rows, you will have extra space at the end of the garden to plant as you desire.

Order your seed and plants at least a month before you need them. I have suggested the use of a number of plants. I believe it is well worth while to go to the extra bother and expense of getting them. An increasing number of seedsmen are selling good vegetable plants. However, it may be possible, and usually is best, to get them from a near-by plant grower or farmer. It is often difficult to get seed and plants in the

desired quantity. You may be able to find a neighbor or two with whom you can combine orders. In order to get the desired varieties, it may be necessary to purchase seed from two or more seedsmen. This may seem a rather foolish recommendation as it complicates ordering. In this way, however, you become better acquainted with several seedsmen and their offerings.

Tools	*Approximate Cost*
A good shovel, spade, or spading fork	$2.50
Iron rake (14–16 teeth)	1.50
Trowel	1.00
Light-weight hoe	1.50
Duster (plunger type) at least 1-quart capacity	2.00
Labels, 100 8-inch painted wooden ones	.65
Garden line, about 30 feet	.25
Stakes, 2 wooden ones 15 inches long for each end of line (to be used to hold line taut and to provide a measure for distance between rows)	
Total	$9.40

Preparing the Soil. Have your soil tested.

If possible, I suggest the use of barnyard manure every year or at least every other year. If manure is not available, it may be possible to get some native peat (or even the baled kind) to take its place.

If the soil is very acid (below pH 5.0), broadcast fifty pounds of limestone per thousand square feet. This is to be turned in. The first three or four years broadcast fifty pounds of superphosphate per thousand square feet before turning over the soil.

If the manure or peat is coarse, it must be turned under with the lime and superphosphate. If of fine texture, either of these organic materials will be of more immediate value if they are worked into the top two or three inches of soil with the fertilizer.

Turn over your garden soil either in the late fall or as early in the spring as the soil is in the proper condition. I prefer the spring.

As soon as the garden is turned over, spread an additional fifty pounds of limestone per thousand square feet. This is to be applied only if the soil is acid (below pH 5.0), and is in addition to the fifty pounds spaded in.

Before planting any seed or plants, broadcast about one pound of the 5–8–7 or similar complete commercial fertilizer (or a half pound of the

4–12–4 if manure has been used) to each twenty square feet or to each numbered row. This should then be well worked into the top two inches of soil by the use of the rake. Fertilize only the part of the garden that is to be immediately planted. As soon as the fertilizer is raked in, sow your seed or set your plants.

Plan of Garden 20 × 25 (500 sq. ft.)

Rows 15 inches apart — Planting dates approximate

Scale: 1 inch = 6 feet

No. ft. from Edge	*No. of Row*			*Plant*
	1	Pole beans, 10 @ 2 ft.		June 1
	2	Carrots, 10 ft.	Beets, 10 ft.	May 1
	3	Tomatoes, 10 @ 2 ft.		June 1
5	4	String beans		May 1
	5	Tomatoes, 10 @ 2 ft.		June 1
	6	Lettuce plants, 20 @ 12 in.		May 1
	7	New Zealand spinach, 10 ft.; for plants, 4 ft. Peppers, 6 @ 1 ft.		June 1
10	8	Lettuce		May 1
	9	Chard, 10 ft.	Parsnips, 10 ft.	May 1
	10	Onion sets (or plants 100 @ 2½ in.)		May 1
	11	Carrots	Beets	June 1
15	12	Cabbage, 7 @ 16 in.*	Cauliflower, 8 @ 16 in.*	Aug. 1
	13	String beans		June 1
	14	Beets		Aug. 1
	15	Carrots	Beets	July 1
20	16	Cabbage, 7 @ 16 in.	Cauliflower, 8 @ 16 in.	May 1
	17	String beans		July 1
	18	Space needed by adjoining plants		
	19	Peas, 20 ft. Chinese cabbage		May 1 July 15

* As it will be difficult to get plants August 1, grow your own. June 1 plant two feet of Golden Acre cabbage and two feet of Snowball cauliflower seed in row 7, these plants when ready to be set in row 12.

The Seed Order

Vegetable	*Variety*	*Ft. of row to be sown*	*Amount of seed*	*Approx. cost*
Beans	Tendergreen	60	1 pound	$.40
Beans	Kentucky Wonder	20	¼ pound	.25
Beets	Crosby's Egyptian	50	1 ounce	.20
Cabbage	Golden Acre	2	packet	.10
Carrots	Red-Cored Chantenay	30	¼ ounce	.15
Cauliflower	Snowball	2	packet	.10
Chard	Fordhook	10	¼ ounce	.15
Chinese Cabbage	Chihili	20	packet	.15
Lettuce	Cos	10	packet	.10
Lettuce	Mignonette	10	packet	.10
Onions (sets)		20	½ pound	.25
Parsnips	Hollow Crown	10	packet	.10
Peas	Laxton's Progress	20	¼ pound	.15
Spinach	New Zealand	10	packet	.10
				$2.30

The Plant Order

Vegetable	*Variety*	*No. of plants*	*To be planted about*	*Approx. cost*
Cabbage	Golden Acre	7	May 1	$.15
Cauliflower	Snowball	8	May 1	.15
Lettuce	New York or White Boston	10	May 1	.15
Peppers	Any sweet	6	June 1	.10
Tomatoes	Comet, early	10	June 1	.45
Tomatoes	Marglobe, late	10	June 1	.45
				$1.45

Fertilizer — 25 pounds 5–8–7 (or similar mixture)..... $1.25

OR

If possible, I recommend a load, or ¼ cord, of barnyard manure or a cubic yard of peat.....$4.00
And 15 pounds of 4–12–4..... .75
$4.75

Lime — If soil is acid (below pH 6.0), 25 pounds of limestone..... $.25
In addition, another 25 pounds of limestone is to be mixed with the soil when turning it over as long as the soil is very acid (below pH 5.0). This will probably only need to be used when garden is first made..... .25

Poles — 20, 6 feet for tomatoes; 10, about 10 feet for beans..... 2.00

For your medicine chest:

¼ pound of Paris green	.20
5 pounds of bran	.20
5 pounds of rotenone dust	1.00
Total for seeds, plants, fertilizer, and pest control	$8.90
Tools	9.40
Additional cost if manure or peat is used	3.50
Cost of turning over garden	5.00
Greatest total cost of garden first year	$26.80

Approximate greatest yearly cost thereafter:

Seeds and plants	$3.35
Fertilizer and lime	5.25
Medicine chest	1.40
Turning over soil	5.00
	$15.00

The Season's Work

Work Program for May

To control the cutworms, make one application of the bait (two and one half pounds of bran, two ounces of Paris green, half a cup of molasses, about a quart of warm water) over the entire garden the night before setting the cabbage and lettuce plants. If you are unable to get the plants, spread the bait some evening just before the first seedlings break the ground. When plants are set, pasteboard collars will provide good protection.

As soon as the soil is ready, plant the following seeds and plants:

Row. No.	*Crop*	*Variety*	*Feet of row*
2	Carrots	Red-Cored Chantenay	10
	Beets	Crosby's Egyptian	10
4	String beans	Tendergreen	20
6	20 lettuce plants	New York or White Boston	20
8	Lettuce	Cos	10
	Lettuce	Mignonette	10
9	Chard	Fordhook	10
	Parsnips	Hollow Crown	10
10	Onions — ½ lb. sets	or 100 plants	20
16	7 cabbage plants	Golden Acre	10
	8 cauliflower plants	Snowball	10
19	Peas	Laxton's Progress	20

Cultivate as soon as you can tell where the rows are. Thin when the seedlings are two to three inches tall (this will probably be in June) as follows:

Lettuce — both kinds — to about six inches apart;

Carrots, parsnips, and chard to three inches;

Beets, allow to grow to six inches tall, then use thinnings for greens.

Repeat application of cutworm bait about May 25.

Work Program for June

Get bean poles and tomato stakes all set before planting. Bean poles should extend at least eight feet above the ground and be sturdy. Set them two feet apart and at least fifteen inches in the ground. Tomato stakes need not extend over five feet above the ground.

About June 1 plant:

Row No.	*Crop*	*Variety*	*Feet of Row*
1	Pole beans	Kentucky Wonder	20 (9 hills)
3	10 tomato plants	Comet	20
5	10 tomato plants	Marglobe	20
7	Spinach	New Zealand	10
	Cabbage	Golden Acre	2
	Cauliflower	Snowball	2
	6 pepper plants	Any sweet	6
11	Carrots	Red-Cored Chantenay	10
	Beets	Crosby's Egyptian	10
13	String beans	Tendergreen	20

Watch for pests. Dust with rotenone twice each week: peas, beans, cabbage, cauliflower, and tomatoes.

Allow not more than *three* shoots to develop on each tomato plant; pinch off other suckers as soon as they appear. Thin before the plants crowd.

Cultivate before the weeds get an inch tall.

Water if necessary — soak, don't sprinkle.

Work Program for July

About July 1 plant:

Row No.	*Crop*	*Variety*	*Feet of Row*
15	Carrots	Red-Cored Chantenay	10
	Beets	Crosby's Egyptian	10
17	String beans	Tendergreen	20

Plant about July 15:

19	Chinese cabbage	Chihili	20

Watch for pests. Dust twice weekly: beans, cabbage, cauliflower, and tomatoes.

Keep the weeds down. As the season progresses, they should get less troublesome.

Tie up tomato plants every six inches with soft twine, raffia, or strips of cloth. Keep suckers pinched.

Water when necessary.

Work Program for August

About August 1 plant:

Row No.	*Crop*	*Variety*	*Feet of Row*
12	7 cabbage plants	Golden Acre	10
	8 cauliflower plants	Snowball	10
14	Beets	Crosby's Egyptian	20

Watch for pests. Dust once each week: beans, cabbage, cauliflower, and tomatoes.

Keep the weeds down.

Tie up tomato plants about every six inches. Keep the suckers from growing.

Water when necessary, and remember that vegetables are ninety per cent water.

Work Program for September and October

Little cultivation should be necessary. Just pull out the few stray weeds before they go to seed.

If you want a good-looking garden spot during the long winter, sow some winter rye seed in the areas left vacant by matured crops or frost. Just pull out the old plants, broadcast a few handfuls of the rye seed (about one half pound per hundred square feet), and scratch in with the iron rake, then water.

Dust once a week: cabbage and cauliflower.

Plan of Garden 20 × 50 (1,000 sq. ft.)

Rows 15 inches apart — Planting dates approximate

Scale: 1 inch = 9 feet

No. ft. from edge	*No. of row*			*Plant*
	1	Pole beans, 10 @ 2 ft.		June 1
	2	Beets		May 1
	3	Tomatoes, 10 @ 2 ft.		June 1
5	4	String beans		May 1
	5	Tomatoes, 10 @ 2 ft.		June 1
	6	String beans		May 1
	7	Tomatoes, 10 a 2 ft.		June 1
10	8	Lettuce, 20 plants		May 1
	9	New Zealand spinach, 14 ft.	Peppers, 6 @ 1 ft.	June 1
	10	Lettuce seed		May 1
	11	Kohlrabi, 10 ft.	Parsnips, 10 ft.	May 1
15	12	Chard, 14 ft.	Plants (*a*) 6 ft.	May 1
	13	Onions		May 1
	14	Carrots		May 1
	15	Space needed by adjoining crops		
20	16	Early potatoes		May 1
	17	Space needed		
	18	Lettuce		June 1
	19	Beets, 14 ft.	Plants (*b*) 6 ft.	June 1
25	20	Kohlrabi, 10 ft.	Radish, 10 ft.	June 1
	21	Space needed		
	22	String beans		June 1
	23	Space needed		
30	24	Lima beans		June 1
	25	Space needed		
	26	Horticultural beans		
	27	Space needed		
35	28	7 Cabbage @ 16 in.	8 Broccoli @ 16 in.	June 15
	29	Space needed		
	30	Lettuce		July 1
	31	Carrots	Beets	July 1
40	32	Space needed		
	33	String beans		July 1
	34	Space needed		
	35	Peas		May 1
		7 Cabbage @ 16 in.	8 Cauliflower @ 16 in.	July 15
45	36	Space needed		
	37	15 Cabbage @ 16 in.		May 1
		Beets		Aug. 1
	38	Lettuce		Aug. 1
	39	8 Cauliflower @ 16 in.	7 Broccoli @ 16 in.	May 1
		Chinese cabbage		Aug. 1
50				

(*a*) Row 12 — May 1, plant 3 ft. cabbage seed and 3 ft. broccoli seed. These plants to be set when ready in row 28.

(*b*) Row 19 — June 1, plant 3 ft. cabbage seed and 3 ft. cauliflower seed. These plants to be set when ready in row 35.

The Seed Order

Vegetable	*Variety*	*Ft. of row to be sown*	*Amt. of seed*	*Approx. cost*
Beans	Tendergreen	40	½ lb.	$.25
Beans	Pencil-Pod Wax	40	½ lb.	.25
Beans	Kentucky Wonder	20	¼ lb.	.20
Beans	Horticultural	20	¼ lb.	.20
Beans	Baby Lima	20	¼ lb.	.20
Beets	Crosby's Egyptian	64	2 oz.	.25
Broccoli	Green Sprouting	3	pkt.	.15
Cabbage	Golden Acre	6	pkt.	.10
Carrots	Red-Cored Chantenay	30	¼ oz.	.15
Cauliflower	Snowball	3	pkt.	.15
Chard	Fordhook	14	¼ oz.	.15
Chinese cabbage	Chihili	20	pkt.	.15
Kohlrabi	Early White	20	pkt.	.15
Lettuce	Cos	40	¼ oz.	.15
Lettuce	Mignonette	40	¼ oz.	.15
Onions	Sets	20	½ lb.	.20
Parsnips	Hollow Crown	10	pkt.	.10
Peas	Laxton's Progress	20	¼ lb.	.15
Potato	Chippewa	20	5 lb.	.20
Radish	White Icicle	10	pkt.	.10
Spinach	New Zealand	14	¼ oz.	.15
Total				$3.55

The Plant Order

Vegetable	*Planted about*	*Variety*	*No. of plants*	*Approx. cost*
Broccoli	May 1	Green Sprouting	7	$.15
Cabbage	May 1	Golden Acre	15	.25
Cauliflower	May 1	Snowball	8	.15
Lettuce	May 1	New York or White Boston	20	.15
Peppers	June 1	Sweet	6	.10
Tomatoes	June 1	Comet, early	10	.45
Tomatoes	June 1	Marglobe, late	14	.60
Tomatoes	June 1	Yellow	3	.15
Tomatoes	June 1	Small-fruited	3	.15
Total				$2.15

Fertilizer — 50 pounds of 5–8–7 (or similar mixture)	$1.75
OR	
If possible, I recommend a load or ½ cord, of barnyard manure or	
2 cubic yards of peat	$7.00
And 25 pounds of 4–12–4 fertilizer	1.25
	$8.25
Lime — 50 pounds of limestone if soil is acid (below pH 6.0)	.50
An additional 50 pounds of limestone should be mixed with the soil when turning it over as long as the soil is very acid (below pH 5.0). This will probably only be necessary the first year	.50
Poles — 30, 6 feet for tomatoes; 10, about 10 feet for beans	3.00
For your medicine chest:	
½ pound of Paris green	.40
10 pounds of bran	.40
10 pounds of rotenone dust	2.00
Total for seeds, plants, fertilizer, and pest control	$14.25
Tools	$9.40
Additional if manure or peat is used	6.50
Cost of turning over garden	7.50
Greatest total cost of garden, first year	$37.65
Approximate greatest yearly cost thereafter:	
Seeds and plants	$5.70
Fertilizer and lime	9.25
Medicine chest	2.80
Turning over soil	7.50
	$25.25

The Season's Work

Work Program for May

To control the cutworms, make one application of the bait — five pounds of bran, one quarter pound of Paris green, one cup of molasses, about two quarts of water — over the entire garden the night before setting the cabbage and lettuce plants. If you are unable to get the plants, spread the bait some evening just before the first seedlings break the ground. When plants are set, pasteboard collars will provide good protection.

As soon as the soil is ready, plant the following seeds and plants:

Row No.	*Crop*	*Variety*	*Feet of Row*
2	Beets	Crosby's Egyptian	20
4	String beans	Tendergreen	20
6	String beans	Pencil-Pod	20
8	20 lettuce plants	New York or White Boston	20
10	Lettuce	Cos	10
	Lettuce	Mignonette	10
11	Kohlrabi	Early White	10
	Parsnip	Hollow Crown	10
12	Chard	Fordhook	14
	Cabbage	Golden Acre (for plants)	3
	Broccoli	Green Sprouting (for plants)	3
13	Onions	½ lb. sets or 100 plants	20
14	Carrots	Red-Cored Chantenay	20
16	Early potatoes	Chippewa	20
35	Peas	Laxton's Progress	20
37	15 cabbage plants	Golden Acre	20
39	8 cauliflower plants	Snowball	10
	7 broccoli plants	Green Sprouting	10

Cultivate as soon as you can tell where the rows are.

Thin when the plants are two to three inches tall (this may not be until June):

Lettuce — both kinds — to about six inches apart;

Carrots, parsnips, kohlrabi, and chard to three inches;

Let beets grow to six inches tall, then use the thinnings for greens.

Repeat application of cutworm bait about May 25.

Work Program for June

Be sure the bean poles and tomato stakes are all set before planting time. Bean poles should extend at least eight feet above the ground and be sturdy. Set them two feet apart and at least fifteen inches in the ground. Tomato stakes need not extend over five feet above ground.

About June 1 plant:

Row No.	*Crop*	*Variety*	*Feet of Row*
1	Pole beans	Kentucky Wonder	20 (9 hills)
3	10 tomato plants	Comet, early	20
5	10 tomato plants	Marglobe	20

Row No.	*Crop*	*Variety*	*Feet of Row*
7	4 tomato plants	Marglobe	7
	3 tomato plants	Yellow	7
	3 tomato plants	Small-fruited	6
9	Spinach	New Zealand	14
	6 pepper plants	Sweet	6
18	Lettuce	Cos	10
	Lettuce	Mignonette	10
19	Beets	Crosby's Egyptian	14
19	Cabbage	Golden Acre (for plants)	3
	Cauliflower	Snowball (for plants)	3
20	Kohlrabi	Early White	10
	Radish	White Icicle	10
22	String beans	Tendergreen	10
	String beans	Pencil-Pod	10
24	Beans	Baby Lima	20
26	Beans	Dwarf Horticultural	20

Watch for pests. Dust with rotenone twice each week: peas, beans, cabbage, cauliflower, potatoes, and tomatoes.

Allow not more than *three* shoots to develop on each tomato plant; pinch off other suckers as soon as they appear.

Thin before the plants crowd.

Cultivate before the weeds get an inch tall.

Water if necessary, but soak, don't sprinkle.

About June 15 the plants should be ready to set from row 12 to row 28. Dig up the largest plants and transplant them carefully about fifteen inches apart.

Bank up the soil around the potato plants.

Work Program for July

About July 1 plant:

Row No.	*Crop*	*Variety*	*Feet of Row*
30	Lettuce	Cos	10
	Lettuce	Mignonette	10
31	Carrots	Red-Cored Chantenay	10
	Beets	Crosby's Egyptian	10
32	String beans	Tendergreen	10
	String beans	Pencil-Pod	10

Watch for pests. Dust twice weekly: beans, cabbage, cauliflower, tomatoes, and potatoes.

Keep the weeds from getting a start; as the season progresses they should get less troublesome.

Tie up tomato plants every six inches with soft twine, raffia, or strips of cloth. Keep the suckers pinched off.

Water when necessary.

About July 15 the plants should be ready for transplanting from row 19 to row 35. Dig up the largest of the plants and set them carefully about fifteen inches apart.

Work Program for August

Plant about August 1:

Row No.	*Crop*	*Variety*	*Feet of Row*
37	Beets	Crosby's Egyptian	20
38	Lettuce	Cos	10
	Lettuce	Mignonette	10
39	Chinese cabbage	Chihili	20

Water when necessary.

Watch for pests; dust once each week: beans, cabbage, cauliflower, tomatoes, and potatoes.

Keep the weeds down.

Tie up the tomato plants. Keep the suckers pinched off.

Work Program for September and October

Little cultivation should be necessary — just pull out the few stray weeds before they go to seed. If you want a good-looking garden spot during the long winter, sow some winter rye seed in the areas left vacant by matured or frosted crops. Pull out the old plants, broadcast a few handfuls of seed (about one half pound per hundred square feet), and scratch in with an iron rake, then water.

Dust once a week: cabbage and cauliflower.

CHAPTER

IV

PLANTING THE GARDEN

It's Great Fun

In my garden, the actual date of planting the first seeds varies from year to year. The plot is plowed and harrowed as soon as the soil is workable. When the season is early, we can plant about April 10, but some seasons it is April 19 before we can get the peas and other hardy seeds in. Whatever the time may be, I get my seeds together, a line, some labels, a rake, and a hoe, and my wife and I start work in earnest. With the rake I smooth up some of the rough spots. Then I carefully put the line up for the first row. For the large seeds, such as peas, I open a furrow three to four inches deep with my hoe. The hoe handle serves to make a furrow an inch deep for the smaller seeds, such as lettuce and beets. Marking a label with the variety name, the source of the seed, and date, I place it at the head of the furrow and proceed to sow the seed as evenly as possible. Using the hoe, I push the soil back into the furrow, covering large seeds with about an inch of soil and small seeds with about half that amount. Then I go back over the row with the flat of the hoe to firm the soil around the seeds. This is important for quick and even germination. I plant peas, carrots, beets, lettuce, onions, chard, and a few feet of cabbage and broccoli for later transplanting. A second planting, made about a week later, consists of cabbage, cauliflower, broccoli, lettuce, and onion plants, and a few beans on which we take a chance with frost. About the first of May a third planting is made: sweet corn, early potatoes, and more beans, lettuce, and others. May 25 the tender crops are planted: seed of squash, pole beans, Lima beans, cucumbers, parsnips, New Zealand spinach, and plants of tomatoes and peppers; also another planting of carrots, beets, lettuce, as well as some cabbage seed for more plants. Then, at about three-week intervals — either when the spirit moves or when space becomes available — are made further plantings of the short-season crops: lettuce, beets, beans, carrots, and

so on. This continues until August, for we seldom have a frost until after October 1 and the hardy crops will grow until the first of November.

When to Plant

It is impossible to give any definite dates for the first sowing of your garden vegetables. There are so many elements that affect the conditions in each garden, all planting dates must be approximate. The dates I give are the average of twenty-five years in my garden just west of Boston. You will have to add or subtract the proper number of days, depending upon how your particular conditions vary from Boston weather. In my garden the average last killing frost in the spring is May 15, some seasons as early as April 25, and occasionally as late as June 1. In the fall the average first killing frost is October 1; at times it strikes as early as September 15 and some years as late as October 20.

I believe it is better to take a chance on the weather and plant some seeds a little early in the spring, as well as make some extra late plantings in the summer if there is room. Seed can easily be replanted, although I admit it is discouraging if things are well along when frosts come.

Some of the elements that affect the date of planting your garden are:

Climate. Each year there is a variation in temperature, rain, and sunshine, and this determines the earliness or lateness of the season. Some sections are influenced by the presence of the ocean or large lakes. If you were to ask your local weather man just when it would be safe to plant your beans, he would not give you a definite date if he thought anything of his reputation. Although weather is unpredictable, near-by farmers are good weather prophets; watch for them to plant. Do not worry about the phase of the moon.

Soil. The make-up of your soil has a big influence on the time of planting. If your garden soil is heavy, with a large clay content, it may mean that you will not be able to plow or work it for as much as two weeks later than if it was sandy. It does not do to work a soil while it is sticky. You have probably read of the old-fashioned way to determine whether or not a soil was satisfactory for cultivating — 'Take up a handful and squeeze it. If it stays in a lump, it is not ready to work.' This is not quite true, for much depends upon how hard you squeeze and the type of soil. My suggestion is to stay out of your garden when the soil sticks to your tools, shoes, or hands.

Location. Is your garden in a frosty hole or up on the side of a hill where the air drainage is good? The usual late spring and early fall frosts are spotty. Even in a small garden, one end of a row may be killed outright and the other end hardly touched. Near-by buildings and trees also affect the severity of frosts.

Drainage. In the spring the soil is usually full of water. Unless your garden is well drained by the natural slope of the land or a porous subsoil, it will be worth while to consider the installation of a drain. This is not a very expensive operation unless it is necessary to go some distance to carry off the surplus water. A drain will also get rid of water during a wet spell or after a heavy downpour. Vegetables do not do well when their feet are wet for more than two or three days.

Hardiness. The time of planting vegetables depends also upon the hardiness of the crop. Quick germination of the seeds is important to prevent rotting. Some seeds will germinate at much lower temperatures than others. This is true also of the seedlings or transplanted plants. Even if there were no danger from frost, it would be useless to set tomato plants when the soil temperature is below 50° F.; new roots would not develop. We can divide the various kinds of vegetables into four fairly distinct groups:

(1) Hardy crops can be planted as soon as the frost is out of the ground. The seedlings and plants will stand a heavy frost — 28° F. — but some will be injured by a heavy freeze — below 26° F.

(2) Half-hardy vegetables should not be planted until the weather has settled and all danger of a heavy frost is over. They will stand a light frost of 30° F. without injury.

(3) Tender plants are killed or severely injured by frosts, although the seeds can be planted before frost danger is past. The seeds may rot in the ground before they germinate if it is too cold.

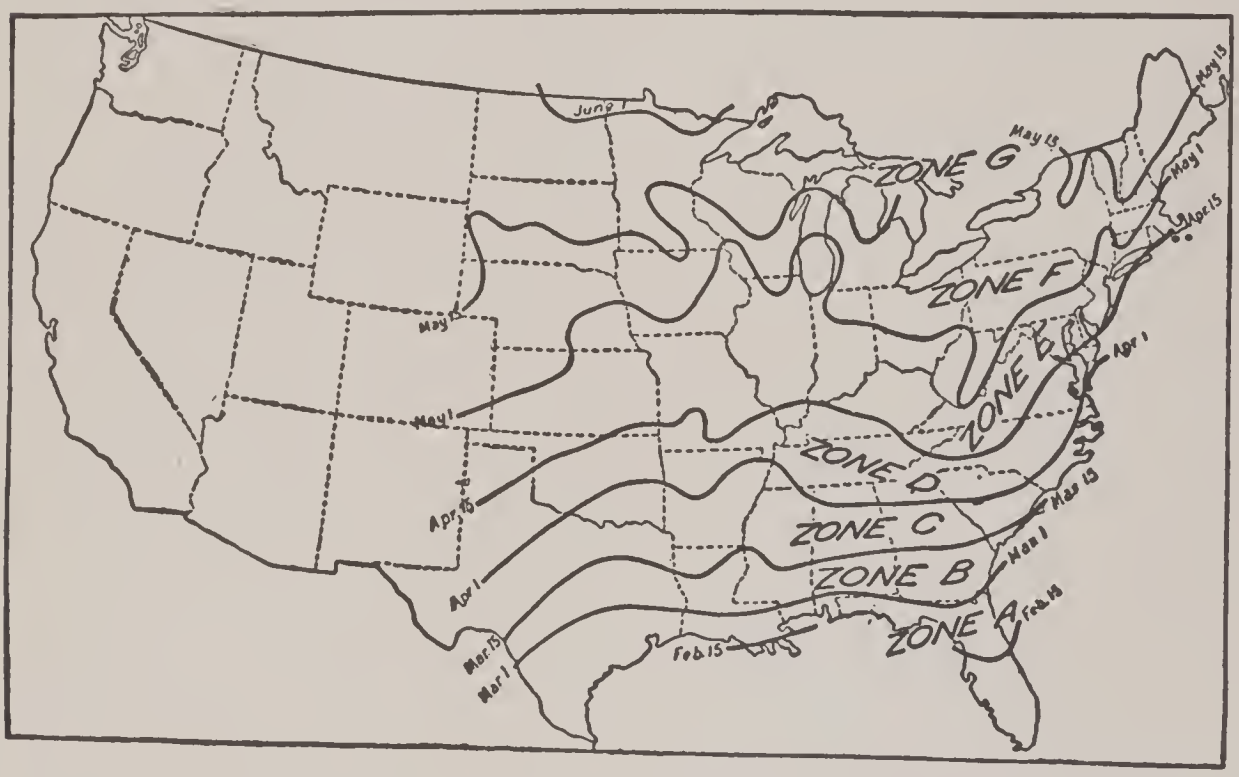
(4) Extra tender seeds cannot be planted or plants set until all danger of cold weather is past. Soil should average 60° F.

I plant about as follows:

April 10 *Hardy*	*April* 20 *Half-Hardy*	*May* 1 *Tender*	*May* 20 *Extra tender*
Asparagus	Broccoli	Beans	Cucumber
Beet	Cauliflower	Corn	Eggplant
Cabbage	Celery	Potato	Lima bean
Carrots	Endive		Melons

April 10 *Hardy*	*April 20* *Half-Hardy*	*May 20* *Extra tender*
• Chard	Kohlrabi	New Zealand Spinach
Kale	Leek	Okra
Lettuce		Pepper
Onions		Pumpkin
Parsley		Squash
Parsnips		Tomato
Peas		
Radish		
Spinach		
Turnip		

Although the date of the last heavy spring frost varies each year, the map below shows the United States east of the Rocky Mountains divided into zones with a difference of about two weeks in the average date of the last killing frost.



Throughout the Rocky Mountain section and to the west, there is such a variation in temperatures within certain areas that no definite zones can be given.

The latest dates for planting crops depend upon the length of time required for maturing the crop, its hardiness, the first fall frost or the

first fall freeze. I consider this matter of keeping crops coming along through the fall very important. Most gardeners fail to take advantage of our long fall growing season. Either the garden fever cools off after the Fourth of July or the gardener does not trouble to plant more seeds as soon as the early crops are harvested. With a little planning, the average garden season can be extended a whole month or longer.

Up to June 1, July 1, and August 1, I plant the following seeds:

June 1	*July 1*	*August 1*
Lima beans	Pole beans	Snap beans
Celery	Horticultural beans	Beets
Cucumber	Broccoli	Chinese cabbage
Leek	Cabbage	Carrot
Melon	Cauliflower	Chard
Onion	Sweet corn	Endive
Parsley	Okra	Kale
Parsnip	New Zealand spinach	Kohlrabi
Potato	Summer squash	Lettuce
Pumpkin		Radish
Salsify		Rutabaga
Winter squash		Spinach

Eggplant, pepper, and tomato seeds are usually started indoors or in coldframes and the plants set outside about June 1. If care is used, the seeds can be planted in the garden May 20 to June 1, and the plants set over or thinned out when sizable. Care consists of constant protection from insects and a good supply of moisture. This cannot be done and mature fruits obtained unless the fall frosts hold off until after October 10.

Spacing the Rows. In the tables, as well as in the directions for planting the individual crops, you will find the recommended distance to allow between the rows. In my garden I make the rows for small crops fifteen inches apart and leave thirty inches for the larger crops. If you are planning to cultivate with a horse or motor cultivator, it will be necessary to make the rows wider. This will save considerable work, but it will take more room.

Sowing the Seed. In order to germinate, a seed must have a constant supply of moisture and air and be subject to a certain temperature. As a rule, the higher the temperature, the quicker a seed will germinate. We do not have a great deal of control over the temperature in our garden soil. We can aid aeration to a certain extent by adding organic matter

to a clay or tight soil. A sandy soil generally provides sufficient air. We can supply moisture by watering during dry spells and by adding organic matter. Then we must cover the seed with sufficient soil to hold the moisture. At the same time we must be careful not to pack the soil with too much or too heavy watering. Although a sprouting seed has considerable power, it may not be able to push through a hard-packed and crusted surface. Also we must not cover the seed with more soil than is necessary to provide satisfactory germinating conditions.

The Depth of Planting. This will vary with the season, kind of soil, and size of seed. In the early part of the season, shallow planting is best, as the temperature will be low and germination will be slow. It is important to get the seedlings up into the air and sunshine as soon as possible, so the seed is barely covered. There will also, usually, be more moisture, both in the ground and from frequent rains. A heavy or clay soil will be more difficult for the seedling to penetrate and it will also retain the moisture better. Therefore I advise shallow planting in this type of loam. As the sun and mercury climb higher, and the soil moisture gets lower, it will be necessary to plant our seeds deeper. 'Four times the diameter of the seed' is an old rule that is not too far out of line; in cool weather and heavy soil, a little less; in warm weather and light soil, a little more.

Quantity of Seed to Use. In order to get the most out of the garden, we want an even stand of plants. Each plant requires a certain amount of room or it will not make a normal growth. The amount of space to give some crops is pretty well established — parsnips, beets, and carrots should be not less than three inches apart. There is considerable variation in recommendations for such crops as peas and beans. Some authorities recommend thinning the plants to stand as much as six inches apart. Personally, I have never done any thinning of these crops, although it certainly would not do to leave the plants too thick. The problem is to sow sufficient seed to provide an even stand of plants without wasting seed. There are a number of elements that affect the germination of seed and growth of seedlings — temperature, moisture, type of soil, presence of disease on the seed and in the soil, depth of planting, and strength of seed. You will find recommendations in seed catalogues and in a number of places in this book. The amount required for one hundred feet of row is usually given. Most of these quantities provide sufficient seed for a fairly thick sowing. I believe it is good insurance to

be generous with the seed, but — and this is important — it means that the seedlings must be thinned out before they become too crowded.

Method of Sowing the Seed. Although I have walked many miles pushing a seed sower, I have never used a machine in my own garden. In my opinion, it is a waste of money to purchase a mechanical seed sower, even if it is a two-purpose machine. It is easy to plant seed by hand and, besides, it's great fun. After a while you will be able to sow the seed quite evenly.

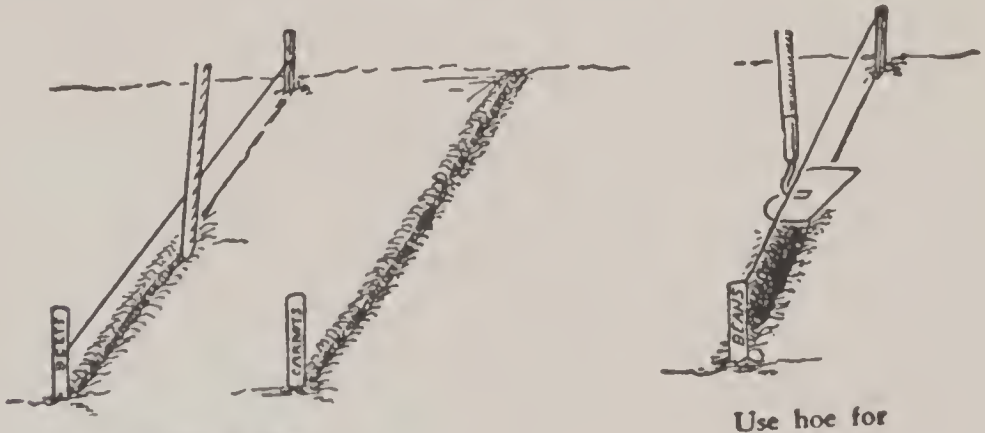
Hints for Success in Planting Seed. Be sure your rows are *straight*. Do not attempt to make a furrow — no matter how short it may be — without using a line. I make two stakes thirty inches long with a notch cut in the middle, or at fifteen inches. This gives me a definite measure at each end of the line for spacing the rows. I make most of the rows for the small crops fifteen inches apart and thirty inches for the larger crops.

Firm the soil around the seed as soon as it is planted. I do this by pounding the soil with the back of the hoe as soon as the seed is covered.

Moisture is most important for the quick germination of seed. If the soil is dry, it will help to use water. If your soil packs and cakes, you must not water too heavily or the little seedlings may not be able to get through. A heavy shower after seed is planted will cause the same trouble. You may be able to help by lightly raking the soil to break up the crust. This cannot be done once the sprouts are up in the soil crust, however.

Well-pulverized soil means better conditions for seed germination and

Make furrows for planting seeds



Use handle of hoe for small seeds

Use hoe for large seeds

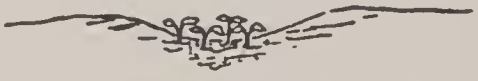
root growth of the plants. Do not attempt to plant your garden until the soil is well worked over. Break the lumps up and rake the stones and trash out of the seed rows.

Fertilizer must not be put too near seeds or plants. It should not be put in the furrow or plant hole; broadcast it evenly over the garden surface and then mix it with the soil. We have little idea how extensive the root systems of the plants in our garden actually are. Even beets and carrots send their roots over a foot in all directions.

Slow germinating seeds give the weeds a chance to get a head start. You can mark the row as well as break the crusted surface by sowing a few radish seeds with the desired crop.

Cutworms can do a lot of damage to a row of freshly sprouted seedlings. In many sections it does not now pay to take a chance. Broadcast the Paris green bran mash before the seedlings appear. As a rule cutworms are not troublesome after June 15.

Unless your soil is low or heavy, do not make a mound, but a depression for planting seeds.



This is how we now make a "hill"

Hills no longer mean actual mounds of soil. In fact, unless your garden is wet, recommendations now call for a saucer-like depression in which vine and other crops are planted. You will probably notice that in my recommendations for sowing seed I suggest the making of a furrow of a certain depth, but, when the seed is covered, less than half the soil should be used. For example, I suggest a furrow an inch deep for most small crops, but then I advise covering the seed with only one-half inch of soil. This means that a slight depression will be over the seed to catch every extra bit of water. Then, when you cultivate later on, this depression will be filled in, providing better support for the plants. The whole garden should be level at all times. The only crop that needs any soil banked up around it is the potato.

Soaking seed before planting is an old custom that has practically disappeared. I have never known any gardener — amateur or commercial — who made it a regular practice. I have planted many kinds of seeds during the past twenty-five years, and have never found it necessary or considered it worth the bother.

Transplanting Vegetable Plants. Both time and space can be saved if you

are able to purchase or grow some plants for your garden. Most kinds of vegetables can be transplanted, but it seldom pays to bother with a few, such as carrots and beans. Plants of early lettuce, cabbage, cauliflower, broccoli, and possibly beets should be set out about April 20. Then, as soon as danger from frost is over, you can plant your tomatoes, peppers, eggplants, and possibly squashes and cucumbers. If at all possible, grow or purchase plants that are in individual containers. When these are set out in the garden they will keep on growing even if weather conditions are unfavorable. Plants without much soil on their roots must be watered and protected for a few days or they will be slow in recovering. It is seldom worth while to attempt to save the thinnings by transplanting them to another section of the garden. If the ground is moist and you can get a lump of soil with the roots, the operation might be successful. I very seldom try it, particularly after the first of June.

If you consider it worth the trouble, you can grow sweet corn, peas, summer squash, melons, and other plants for an extra early crop. These must be grown in pots or strawberry baskets, for if the roots are disturbed in the transplanting process the plants will seldom recover.

If possible do your transplanting on a cloudy day. A thorough soaking will also help freshly set plants.

Be careful not to leave any air holes near the roots of the plants. Firm the soil around the roots and leave a slight depression around the stem. Then, if it is necessary to water, it will be a simple matter to get the water onto the roots where it will do the most good.

You can set out cabbage, cauliflower, and broccoli plants any time up to August 5. Celery plants can be set out from May 1 to July 15.

Plant Protectors. By the use of some sort of frost protector, a number of vegetables can be matured from two weeks to a month earlier. Either plants or seed can be started under them. For full details, see Chapter IX on Growing Early Vegetables.

CHAPTER

V

SUMMER CARE OF THE GARDEN

A Prime Necessity

It is up to you whether or not the summer care of your garden becomes a burden or continues to be a pleasurable, healthful hobby. I hope you have not tried to make too much of a garden. I have done my best to warn you that the garden fever may get the best of your judgment because it is so much fun and so easy to plant. Now, it will be important to keep ahead of the various jobs as they appear; one hour spent in thinning, weeding, pruning, and cultivating at the proper time will equal three or more a few days later.

Cultivation. In order to obtain the best results, cultivation should begin as soon as the seeds are up enough to mark the row or the transplanted plants have started to grow. It is impossible even to suggest how often it will be necessary for you to cultivate. During dry spells, I often find that one stirring of the surface soil will suffice for three or four weeks. A shower usually packs the soil and it is not long before a new batch of weed seedlings appear. If you get busy before these grow more than an inch, they can be easily killed. If you wait too long — well, you'll be sorry. As a rule, if you keep the weeds down, you will not have to worry about any further cultivation.

Do not cultivate more than an inch deep. Vegetables are shallow-rooted, and if the plants are more than half-grown their roots are well distributed throughout the topsoil. If your topsoil is eight inches deep and you cultivate two inches deep, you rob the plants of almost a quarter of their possible feeding area. This is particularly true if you attempt to hill the soil up around any plants. Hilling-up plants, I repeat, is an old custom that cannot be condemned too strongly. Level cultivation is best for all vegetables except potatoes, which need to be protected from the sun as the tubers develop.

Tools. I have given up suggesting that one tool is better than another

for certain work in the vegetable garden. For several years I had a collection of garden implements and a demonstration rack which I took with me when I gave a talk on the subject. It took me some time to realize how hopeless it was to tell people what tools they should use, on the basis of my own personal experience. Certain tools I condemned as useless gadgets I found to be someone's favorites, and for over five years now I have refused to give a lecture on the subject. I believe you will become attached to certain tools and find them useful for a number of operations. I use a round-top onion hoe for leveling, furrowing, making holes for plants, cultivating, and weeding.

Do not buy a double-purpose tool; it is seldom good for either operation and you will seldom find time to change it. I find a hand weeder useless in a vegetable garden, though you might like a knife type to help in thinning.

A wheel cultivator with a flat knife-blade is a handy tool in a good-sized garden. For heavy or stony soil you will find cultivator teeth more practical. Young people — and some older ones — prefer a machine they can push, for the mere mention of the word 'hoe' brings to mind the vision of an unpleasant task.

Mulching. Very few vegetable gardeners take advantage of mulching their crops. Strawy manure, grass clippings, hay, straw, peat, or other similar material can be spread on the surface of the garden to conserve moisture and keep down the weeds. The plants will grow better, and on such crops as tomatoes the fruit will be cleaner. Cucumbers, melons, tomatoes, rhubarb, pole beans, and possibly cauliflower, broccoli, celery, and potatoes, can be mulched. The mulch should be applied as soon as the plants are well established. Fertilize and cultivate the soil just before using the mulch. Then use enough to keep the weeds from growing. This will take about three inches of grass clippings or strawy manure, six inches of straw or hay, and about two inches of leaf mold or peat. If properly done, there will be no need for further attention the rest of the season. Do not try to skimp on the mulching material. If the weeds or witch grass once get a start, you will be in for a tedious and strenuous task.

Thinning. Every plant requires a certain amount of space, and I have recommended that you be generous with seed when planting. This means that you will have to get down on your knees and take out ninety per cent or more of the little seedlings. Beet and lettuce thinnings are

about the only seedlings of value. If you like beet greens, you can wait until they get six to seven inches tall before thinning them. This is not a good practice and should not be tried on any other crop. Thin out the plants to the proper distance when they are two to three inches tall. The lettuce thinnings can be used in a salad. If you put off the thinning too long, the plants that will be left will be weak and spindly. Do not try to save the seedlings you have pulled up by transplanting them to some other section of the garden; it is seldom worth the trouble. By careful and timely thinning, a uniform stand will be secured.

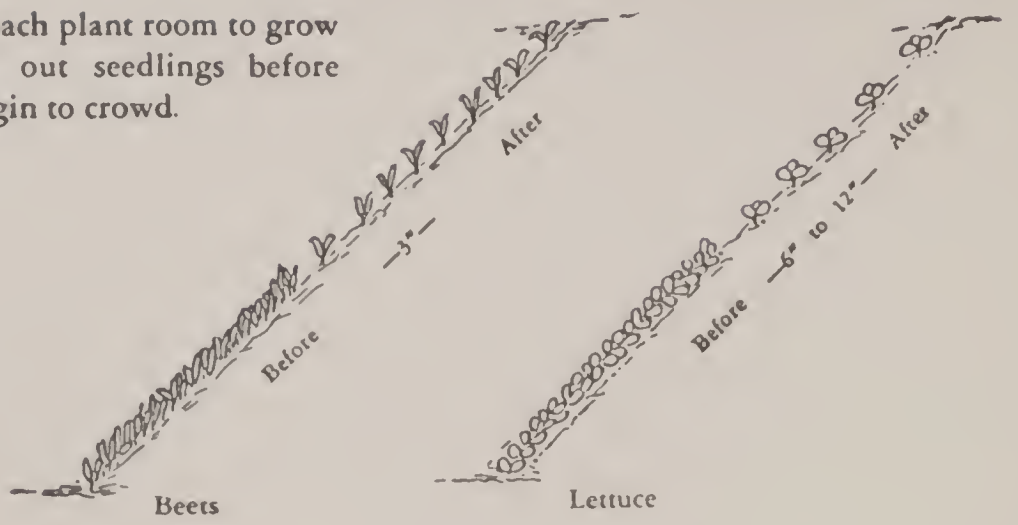
Transplanting. Success in transplanting plants to the garden depends on obtaining good plants, handling them carefully, and having the soil thoroughly prepared. When transplanting, the plants should be watered several hours before they are moved. It is difficult to set plants in a hard or lumpy soil, and even more difficult to get them off to a quick start afterward. As a rule, plants should be set slightly deeper than they were in the seedbed or container. If the plants are exceptionally tall, they can be set several inches deeper, and preferably on a slant. If possible, choose a cloudy or rainy period. If this is impossible, water the plants after they are set; then it may also be advisable to protect them from the wind and sun for a day or two.

Some authorities recommend removing part of the foliage when overgrown plants are set in the garden. Celery is the only vegetable that will profit by this treatment, and both the roots and tops should be cut back equally.

A trowel is the best tool to use for transplanting. If the soil is mellow and the plants small, you can use your hands or fingers.

How much room are the plants going to occupy when they are fully grown? It does not do to crowd plants too much, even though we want to get all we can out of our garden. If you do not know how to space the plants, see the table on page 12 for distances. These will naturally vary somewhat according to the variety and the growing conditions. For example, where there is a generous supply of food and moisture, Marglobe tomatoes grown flat will cover the ground when planted 4×5 feet apart. On a poor, dry knoll they can be spaced 3×3 feet, and may not even touch.

Water. Vegetables must have a steady supply of water to produce a normal crop of good quality. Very few of us will ever have a garden where the moisture conditions are just right for any great part of the



season. If you can apply water when your plants need it, you should have a pretty good garden. Seldom do we have a growing season without at least two dry spells to upset our planting schedule and cut down the quality and quantity of the crops. Often during periods of drouth we are forbidden by the authorities to use any water on our garden. Many of us have a metered service which makes it expensive to use much extra water.

If it is practical, I suggest the installation of a water pipe to the garden with a permanent outlet in a place where it will be handy, yet out of the way. You will be much more likely to water if it requires only one length of hose instead of two or three, and, in addition, it will save much wear and tear on the hose.

'Soak, don't sprinkle,' is a precaution often seen and heard today. In spite of this, it is a common sight to see someone sprinkling his garden with a hand nozzle. This is merely 'teasing' the plants. It is like being thirsty and having someone sprinkle a few drops over your face. With a hand nozzle we try to cover too much ground, and actually may do harm if we sprinkle too often. Get a good overhead sprinkler and leave it in one place for an hour or so, then move it a little. Apply the water at any time of the day or night that is most convenient. Never water the same part of the garden oftener than twice a week.

Cultivate after watering as soon as the surface has dried. A heavy watering may cause trouble by packing a heavy clay soil, particularly just before the seedlings break through.

Applying Extra Plant Food. If you follow my directions for feeding the garden, it should not be necessary to make any further applications of

fertilizer to most of the vegetables. Celery is the only crop for which I supply extra plant food. When the plants have become well established, I spread a broad line of fertilizer on each side of the row about six inches from the plants. I use the regular complete commercial chemical fertilizer, 4–12–4 or 5–8–7, at the rate of about three pounds to each twenty-five feet of row. As nitrogen is the only plant food the plants will be able to get when the fertilizer is used on top of the soil, you may prefer to use nitrate of soda or sulphate of ammonia — about a pound of either one for each twenty-five feet of row. These materials, however, are hard to obtain and expensive when purchased in small quantities. In large quantities, they attract moisture and become hard when stored.

The conditions under which the use of extra plant food might be necessary are:

1. In a new garden where the original plant food content of the soil was low.

2. Where the fertilizer has not been well mixed with the soil. (Some gardeners make the mistake of plowing or spading under their commercial fertilizer, thus getting most of it several inches deep.)

3. Where a sandy or gravelly soil causes much of the available plant food to leach out quickly. (This is especially true during a rainy season or where a great deal of water is used.)

4. In case you were in a hurry and planted your seed or set out your plants without making the regular fertilizer application.

In any of these cases it would undoubtedly pay to apply extra fertilizer around the plants or hills or between the rows. This operation is called 'side dressing' or 'top dressing.' It would be rather useless to use an organic fertilizer for this purpose. The most soluble materials available should be used. There are a number of patented soluble complete fertilizers now on the market that are being extensively advertised. They are good, but expensive. You should follow the directions of the maker. If you prefer, you can use the oldtime liquid manure — 'the color of weak tea.' As this is just as weak in plant food content as it is in appearance, it must be used once a week. It is made by soaking a bag of manure in a container of water.

I suggest you use your regular complete commercial fertilizer, whatever analysis it might be. Use from one to three pounds for each twenty-five feet of row, spread about six inches from the plants. It is best to cultivate this in immediately. As soon as water is applied or it rains,

the plants will be able to get the soluble food. Two light applications are better than one heavy dose. Be careful not to get any fertilizer on the plants, as it is liable to burn, but do not be too concerned about getting the material close to the stem of the plant, as the roots are much longer than you imagine.

Training. You can save garden space and get better-quality fruit if you train your tomato plants to a stake or string. Complete directions will be found under 'Tomatoes' in the next chapter. Start them right when they are young.

Pole beans and peas, of course, do not require any attention once they have found something to which they can cling and climb. Both crops might require a little guidance at first, particularly if you were a little late in providing support for them.

Cucumbers, squash, and melons are not easy to train. It is possible to grow these crops on a trellis, but, although a number of my gardening friends have tried it, I have never seen it done successfully.

Blanching. In order to obtain the best quality in some vegetables, it is necessary to shut out the sunlight for a certain period. As this prevents the formation of coloring matter, the process is called 'blanching' or 'bleaching.'

Celery is blanched by paper, boards, or soil. If you desire, individual paper cylinders may be purchased. Soil is used only for the green varieties and in the fall. Regular inexpensive celery-blanching paper can now be purchased at most supply houses catering to vegetable gardeners.

Endive is blanched by tying the leaves above the center of the plant.

The curd of cauliflower must be protected from the sunlight in order to look and taste well. This is done by tying the leaves together above the center of the plant. (For further details on blanching, see the next chapter.)

Late Planting. By the first of July every square foot of the garden should be used. Plantings after that time will be made only when some other crop is harvested or fails. Just as soon as space is available, get in your late plantings. Have some cabbage, cauliflower, and broccoli plants coming along for use up to August 1. Celery plants can also be set out up to that time, but do not attempt this fussy crop unless you have a good watering system or an extra good loam.

Seed sown when the soil is dry should be planted about twice as deep as when wet, cool weather is to be expected.

Pull out a crop when it is of no more value. There is no excuse to let plants remain after they start to go to seed.

August 10 is the latest date I can plant seed and hope to get a crop. Beets, lettuce, spinach, radish, and possibly beans, if planted then, will usually mature in my garden.

CHAPTER

VI

CULTURAL METHODS

All About Each Vegetable

In this chapter, arranged in alphabetical order, are given the commoner vegetables along with details of the proper planting and care of each. In order to avoid repetition, little is said about the regular application of plant food or the control of pests. Mention is made of these only where the plant requires special treatment. For full directions, see the Appendices.

No reference is made to the cultivation of the various crops, for I believe the whole garden should receive the same treatment. I take it for granted that you are going to keep the weeds down. If you do this properly, you need not worry about other cultivation. Get the weeds when they are small and you will spare yourself a lot of hard work later. You will also spare the vegetables undesirable competition.

Neither do I state the type of soil preferred by the various vegetables. Most of us will have but one type of soil, and if this is properly prepared we shall be able to grow most crops satisfactorily. If, after three years' trial, you find that a certain crop will not do well in spite of particular attention, forget about it and devote the area and time to some other.

Asparagus

This is one of the very few perennial vegetables commonly grown in our gardens. If properly planted and cared for, a bed should continue producing good-sized spears for fifteen years or more. Asparagus can be made to thrive in almost any soil except a heavy clay. It is the usual practice to make the bed at one end of the vegetable garden where it will least interfere with cultivation of the other crops. I suggest you plant at least ten roots for each member of the family. Set them fifteen inches apart. This means two rows about thirty feet long for a family of four or five. If more room is available, I strongly urge another row.

Asparagus is the first crop you will harvest each year, and one of the best of Nature's own spring tonics. If you have never eaten this delicious vegetable cut just before cooking, you have a taste thrill to look forward to that can hardly be matched. Furthermore, you can cut it almost every day for four to five weeks.

Variety. Mary Washington is the standard variety the country over and is listed by most seedsmen.

Seed and Roots. I recommend that you purchase one-year-old roots; buy twice as many as you actually need. Select the huskiest and healthiest and throw the rest away. This may seem a waste, but it has been definitely proved that the largest roots of a given lot produce the most and largest shoots. It pays to be particular in starting a bed that is going to last for fifteen years.

If you wish, you can raise your own plants. For one hundred roots, purchase one ounce of seed and sow it as early in the season as possible in one of the garder rows about forty feet long, allowing a foot on either side. When the plants are two to three inches tall, thin them out to about three inches apart. Cultivate and keep the plants growing throughout the season. Leave in the garden all winter. As soon as the ground is workable in the spring and you have the trenches of the permanent bed ready, carefully dig up the roots, select the required number from among the largest, and plant immediately. This process of growing your own roots, however, will set you back a year in the starting of your asparagus bed.

Preparing the Bed. The roots should be planted as early in the spring as possible; I planted mine April 19. As the asparagus will occupy a section of the garden for a long period, the soil should be specially prepared. An extra amount of food and organic matter must be thoroughly mixed with the soil. Once the roots are planted, it will be possible to apply additional food and organic matter only to the surface. Here is the one place in your garden you should use manure. Spread a generous coating of any kind of barnyard manure, apply ten pounds per hundred square feet of some commercial fertilizer, such as a 5–8–7, and broadcast eight pounds per hundred square feet of ground limestone. Turn all this over, making narrow cuts with the fork or shovel in order to break the sod into small pieces and the better to mix the soil, manure, fertilizer, and lime. Dig to a depth of at least ten inches, even if you bring up some of the subsoil. After this is done, make the trenches for the roots,

using a shovel. The depth of the trenches will depend on the character of the soil. If the loam is heavy and the subsoil a compact clay, dig the trenches about five inches deep; if the soil is light and well drained, make them eight inches deep. The trenches should be about three and one half feet apart.

Planting the Roots. The asparagus roots are spread out on the bottom of the trench about fifteen inches apart, with the buds on top and in the center. Pull down sufficient soil from the sides of the trench to cover the roots and the buds about an inch deep, then press firmly.

Care the First Two Seasons. Shoots will soon appear, and if the roots were of fairly good size, stalks two to two and one half feet tall should develop by the middle of July. Get after the weeds as soon as they get started. Be careful not to fill in the trench too soon and thereby smother the plants. You will be tempted to try to kill the weeds in the bottom of the trench the easy way by simply pulling the soil from the sides and top of the trench down and smothering them. This must not be done until each asparagus plant has three or four good husky shoots. The trenches should not be filled in completely until the second season. Watch for the asparagus beetles and also aphids.

Cutting. If the plants have grown well, they should produce several stalks three to four feet tall the second summer. If this is so, you can begin cutting the spears the following spring (two years from planting) and continue cutting for three weeks. Then allow the shoots to develop. Keep the weeds down and watch for the beetles. The growth made during the summer determines the size and number of shoots you can cut the following spring. An extra dry summer means a poor crop next spring unless you have some means of irrigating the bed. The plants are deep, so it will take a lot of water to be effective. The third spring from planting, the bed should be in sufficiently good condition to cut for six or seven weeks. Cut or break the spears just at or below the ground level if you want green asparagus. For best quality, use the spears before they get too tall and 'feather out.' If you prefer white asparagus tips, mound the soil over the plants and cut the spears as soon as the tips break through the soil, making the cut about four to five inches deep and using care not to injure near-by buds.

Special Care. Feed the asparagus bed with the same materials, in the same amount and at the same time as the rest of the garden. An extra feeding of nitrate of soda — a half-cup per plant — at the end of the

cutting season (about June 30) will stimulate growth. Salt is of no value except to kill weeds, and it takes so much to do that successfully that I do not advise you to try.

When the tops die in the late fall, they should be gathered and burned.

Beans

SNAP, SHELL, LIMA, AND SOY BEANS

Snap or String Beans

One of the easiest vegetables to grow and the quickest to mature, string beans should occupy a generous part of your garden. The many satisfactory varieties offer a diversity in color, texture, and flavor. With practically all the popular kinds now offered absolutely stringless, the name 'string' bean is a misnomer and the planting of a variety with a string in it is inexcusable. Beans are probably the least fussy of any crop.

Bush Snap Beans

Varieties. There are a number of satisfactory varieties listed in every catalogue, and new 'superior' ones are introduced each year. Picked when young and tender, then cooked immediately, all will be of excellent quality and actually offer little choice. As the pods get older and larger, the differences in flavor and texture increase. You will find the round-podded varieties best. For green beans, try Tendergreen, or, if you prefer a real strong bean flavor, grow the Stringless Green Pod. For a yellow or wax bean, grow Pencil-Pod Black Wax.

Planting. A pint or pound of seed will easily plant a hundred feet of row. Sow the beans in a broad furrow two or three inches wide and three to four inches deep, dropping about eight beans for each foot of row. Cover the seed with a little less than an inch of heavy soil or a little more than an inch of light soil, filling the furrow in later as the plants develop. Make the rows from two to two and one half feet apart, depending on the crop that is planted in the adjacent row. String beans are a warm-weather crop, but I prefer to take a chance and make a planting fairly early — May 1 or earlier. Only one year out of eight have I been caught by a late frost. At each planting I sow both a green and a wax variety. They usually mature a few days apart and make for a variety on the table, both in color and flavor, almost as good as two different vegetables. For a succession of tender beans, make a plant-

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ing about every three weeks up to August 15, or approximately forty-five days before you expect the first fall frost.

Harvesting. Naturally, the smaller the pods the more tender they will be, but for real bean flavor they must be allowed to size up. There will be a difference between varieties in this matter. You have possibly been warned to pick string beans before the beans are noticeable in the pods. Varieties of the Stringless Green-Pod type show the bean early and should therefore be allowed to remain on the plants for a few days longer. In order to keep plants producing new pods, the old ones must be kept picked. If some do escape you, by no means throw them away, for they make the most delicious shell beans. If by chance they have reached the dry stage, they can be shelled and saved for baked beans. My family prefer them to the common pea bean for this purpose.

Special Care. Watch for the Mexican bean beetle. We used to consider beans pest-proof, but this beetle from down Mexico way is making up for lost time. Little can be done about bean diseases.

Pole Snap Beans

Pole beans add interesting height to the vegetable garden. By all means plant at least three poles.

Varieties. Kentucky Wonder is without doubt the most popular and best of the green pole beans. Stringless until it gets quite old, its distinctive flavor has only recently been truly appreciated. It is now offered for sale in most large markets during its comparatively short season, usually selling at a premium over the bush varieties. A number of other varieties are listed by seedsmen, but they are either late, shy bearers, or stringy. Scarlet Runner beans are for ornamental purposes. The pods must be picked very small if you plan to eat them.

Planting. Put in your poles first, and be sure they are substantial ones and well set. If they are not too husky, you might place them wigwam-like, fastening them with a wire (string may rot) a foot or two from the top. The poles should extend at least seven feet above the ground, and should be of some rough material to offer good support to the heavy vines. Plant about eight seeds in a shallow furrow around each pole. One planting is usually sufficient.

Harvesting. Same as bush beans. Remember that pole beans also make good shell beans when they have gone by the snap-bean stage and excellent baked beans when dry.

Special Care. Bean rust is a common disease of pole beans, particularly the Kentucky Wonder variety. In some sections it has become so serious that it kills the vines before any pods are usable. Little can be done. Rust-resistant strains are being developed, and are worth trying if you cannot grow the standard strain. Watch for the Mexican bean beetle.

Shell or Horticultural Beans

A number of varieties of shell beans, both bush and pole, are offered by seedsmen. They take up considerable room for the amount of eatable material they produce. If you have sufficient room and are sufficiently fond of succotash or plain shell beans, by all means plant some.

Planting. Shell beans take about a month longer than the common snap beans to develop, so not more than two plantings of the bush variety can be made. Seed is planted as for the snap beans.

Harvesting. The pods should not be picked until the seeds are fully formed, but should be picked before the pods are dry. The pods of the Horticultural varieties are supposed to assume brilliant splashes of crimson when ready to harvest, but this takes place only under ideal growing conditions. Dried shell beans also make excellent baked beans.

Special Care. Watch for the Mexican bean beetle.

Lima Beans

With the introduction of earlier and freer setting varieties, Lima beans are now easy to cultivate.

Varieties. There are two types of bush lima beans: the small podded or 'baby' limas, such as Henderson's Bush and Baby Potato, and the later maturing, large-podded type, such as Fordhook. Pole varieties are larger-podded and much later in maturing, so should not be attempted unless you have a long growing season. Ideal is the best variety. I suggest that you first try one of the more dependable 'baby' or bush varieties.

Planting. Plant the seed when the ground is thoroughly warmed up — at the time you set your tomato plants, about June 1. I have never been able to prove that it was necessary to set each bean seed with the eye down. Sow the same as snap beans.

Harvesting. For green Lima beans, the pods must be picked before the seeds are fully grown. Open a few pods to determine for yourself at just what stage they should be picked. The dried beans, of course, can be saved and cooked when desired.

Special Care. Although the Mexican bean beetles prefer ordinary soft-leaved beans, they will often attack the tough Lima bean leaves and make lacework out of them in a few days unless you prevent them by frequent applications of rotenone dust.

Soy Beans

In 1940 an edible soy bean variety was offered by several seedsmen for the first time. In 1941 several varieties were offered, showing the interest in this vegetable, old to the world but new to our gardens. It is easy to grow and is seldom damaged by the bean beetle. The flavor is about halfway between a Lima bean and pea. The pods are small, containing but two or three small beans, and soft, but fibrous, making shelling a slow, tedious process. This is one of its main disadvantages, another being the long season required for growth. Planted June 1, the pods will not be ready for picking until after September 1.

Planting. Seed is sown just the same as the snap beans. The plants grow more upright than other kinds of beans and reach a height of two and one half to three feet.

Beets

Beets are easy to grow, attractive when growing, quick to mature, and providing two vegetables from one row (greens and roots), they should be included even if your garden is small.

Varieties. Crosby's Egyptian is the standard variety for planting throughout the season. Early Wonder is very similar. Detroit Dark Red may have a deeper inside color, but it is slower to grow and the quality is not quite so good. Some home gardeners claim the Long Season, also known as Winter Keeper and New Century, is the best variety. It is slow to grow, but remains tender even when large and old. Unfortunately, many fibrous roots cling to the long top-shaped beet when it is pulled.

Planting. Each beet seed actually contains two or three seeds, so it is not necessary to sow the seed thickly. Plant in a shallow furrow, about ten seeds to a foot, covering the seed about one-half inch. Two ounces of seed will plant more than one hundred feet of row. Make the rows twelve to fourteen inches apart. For a continuous supply of tender beets, make a sowing every four weeks. The seed can be sown as soon as the ground can be worked — April 10 — and for the late crop as late as August 15.

Thinning. For proper development, beet plants should be thinned to be four inches apart. If you like beet greens, you can let the thinning process wait until the plants are six to eight inches tall and use the 'thinnings' for cooking. Otherwise, thinning should be done before the plants are four inches tall. Crowding hinders the normal growth of any plant.

Harvesting. Do you like tiny beets? Then pull them when they are small. Do not worry over a beet 'bleeding' to death. It makes little difference where you cut the tops off. If you do not use up all of one planting by the time the next sowing is ready, pull up the large, old roots and throw them in the compost pile — or use them for beet soup — thus making room for something else. For storage instructions see Chapter X.

Special Care. Beets are the best plant indicators of the soil conditions in your garden. If the tops are well developed and of a dark green color, possibly with red veins, you can be reasonably sure your soil is in good condition. If your beets fail to grow normally, you should have your soil tested immediately. Prompt treatment will quickly bring back normal growth.

For an Extra Early Crop. Beet seed can be planted indoors about six weeks before the garden is prepared and the seedling plants set directly in the garden about four inches apart. Rows should be twelve inches apart. A gain of about two weeks will be made.

Broccoli

This very popular yet comparatively new vegetable has heretofore not been grown to any extent in home gardens. As its culture is about the same as that of cabbage, there is no good reason why you should not try it.

Varieties. Italian Green Sprouting is the standard variety. The Calabrese strain is best.

Planting. It is best to sow the seed in a special place and transplant the plants to the proper place in the garden. For the early crop, seed must be started indoors. The plants should not be set out in the garden until all danger from a hard freeze is over — May 1. For later crops, seed can be planted in a special frame or directly in a nursery row in the garden. I plant about two feet of row to broccoli seed (as with cabbage and cauliflower) once a month from April 20 to July 20. The seedlings

are thinned to two inches apart and the plants are transplanted to an unoccupied space when they are six to seven inches tall. Plants may be purchased if desired.

Harvesting. The flower head is cut while all the tender buds are still tightly folded. A few inches of the stem and leaves may be used, although it will require somewhat longer cooking. If you cannot use all the heads as they become ready, do not leave them on the plant to blossom. Cut them off to encourage the production of side shoots with more but smaller heads. You will find that some plants develop a central head on a thick main stalk, while others immediately branch out and produce several small heads. In warm weather the heads will be quite loose and 'go by' more quickly. Plants will usually produce two cuttings and sometimes three.

Special Care. Expect the cabbage worm. Treat the early plants for the cabbage maggot and watch in the fall for the cabbage aphids.

Cabbage

Be sure to include cabbage. Many home gardeners have not grown this vegetable because they thought it necessary to purchase plants and wished only a very few. Good vegetable plants are not too easy to obtain, particularly in small lots and at the time you want them. For years I have suggested that home gardeners grow their own plants by simply sowing seeds in a few feet of row in their garden at various times during the season. Then, when a place is available, after pulling a few beets or cutting a head or two of lettuce, plants will be ready to set right in. Plants for the early crop must be grown indoors unless you buy them.

Varieties. Another break with custom that I have urged for years is that of planting early, mid-season, and late varieties of some vegetables. In my own garden I have always chosen the variety of highest quality and grown it throughout the season. The Golden Acre cabbage is now the standard early cabbage everywhere, but I find that it does just as well in summer and fall. Quick to mature, good to eat, and with a small head four to six inches in diameter, it is ideal for the home garden. For a change in color, I plant a few Red Acre and, for a different flavor, a few Savoy. Recently a new strain, Green Acre, was introduced. If more green means more vitamins, it will be worth growing.

Planting. Cabbage does best in cool weather and where it is fairly

moist, but should grow satisfactorily failing these conditions. For the early crop, seed must be started indoors and the seedlings transplanted in order to develop husky plants. The plants can be set out in the garden as soon as danger of a hard freeze is over — April 20. The varieties mentioned above can be planted about fifteen inches apart each way. If you grow other varieties that produce a large frame, you will have to give them more room. Seed sown in two feet of row in your own garden at the time you do your first planting — April 20 — will provide plants for transplanting by June 1. Similar plantings once a month through July 20 should give you a steady supply. Plant the seed in a shallow furrow an inch deep. Cover them with one fourth inch of heavy soil or one half inch with light soil. The seeds sprout quickly. Thin out the seedlings in your 'nursery' row about two inches apart to get some good, husky plants. These can then be moved to a vacant spot in the garden over quite a long period — from the time they are six inches tall until the little head starts to form. If large, they will require watering and protection from sun and wind for a few days after moving.

Harvesting. The heads are usable any time after they begin to form. If growing conditions have been good, you will find the leaves of the soft heads very tender and tasty. If left in the garden too long, the heads will split open. They should be used soon or pulled up and discarded. Pull out a plant as soon as the head is cut, thus making room for a sowing of something else as soon as possible.

Special Care. Watch for cutworm, cabbage maggot, cabbage worm, and aphids. If a plant shows serious signs of disease, pull it up with care and dispose of it in such a way that the trouble will not be spread. If swellings on the roots indicate that your garden is infected with clubfoot, you must not plant any member of the cabbage family for three or four years.

Carrots

If you have not pulled a bright, orange carrot from the ground, cleaned it off, and eaten it right then and there, you have a treat waiting for you. A vegetable that can be used almost every day either raw or cooked, carrots should be planted even in the small garden.

Varieties. The quality of carrots has been greatly improved during the past few years. Red-Cored Chantenay and Tendersweet are normal-sized varieties that have the same quality previously obtainable only in the small French Forcing and Nantes strains.

Planting. Carrot seed is slow to germinate. If you wish, you can sow a few radish seeds with the carrots to mark the row and help break the soil for the weaker plants. If your garden soil packs and forms a crust, it may be best to sow the carrot seed rather thickly, although this means more work when it comes to thinning. Plant carrots in a shallow furrow an inch deep. Cover the seeds with about one fourth inch of a heavy soil or one half inch of light soil. Make the rows twelve to fifteen inches apart. The seed can be planted as soon as the ground can be prepared. For a continuous supply, make a planting once a month up to August 1.

Thinning. The seedlings must be thinned when three to four inches tall or spindly plants will develop. Leave the plants about three inches apart.

Harvesting. A carrot can be pulled and used as soon as the root is of sufficient size to make it worth while. Under good conditions, the roots of the varieties recommended will remain usable all summer, and the residue can be stored for winter use.

Special Care. Carrots are one of the few vegetables which have no particularly common disease or insect pest. Occasionally you will find a celery worm feeding on the foliage. This is a bright black-and-yellow-striped, smooth worm an inch long that sends out an orange horn when touched. Just step on it. You may also be troubled with carrot blight, a fungous disease causing the leaves to turn brown, or the carrot rust fly, a small maggot that gets in the roots. There is little you can do about either, so be thankful they are very seldom serious.

Cauliflower

This aristocrat of garden vegetables is not easy to grow. To produce a large, firm curd or head, good growing conditions and cool weather are necessary. Unless a garden is in a location subject to fairly cool, damp nights, cauliflower should not be planted so that it will mature during hot weather. Plants set in the early spring (May 1) or midsummer (July 10 to August 1) should produce good heads under average growing conditions. Try a few plants. If you can produce good heads three crops in succession, you will have done something to brag about. The culture is very similar to that of cabbage except that in all ways the plant is somewhat more tender.

Varieties. Practically every seedsman has his own named strains of this vegetable. Buy the best; it will usually be some improved strain of the old standard variety Snowball.

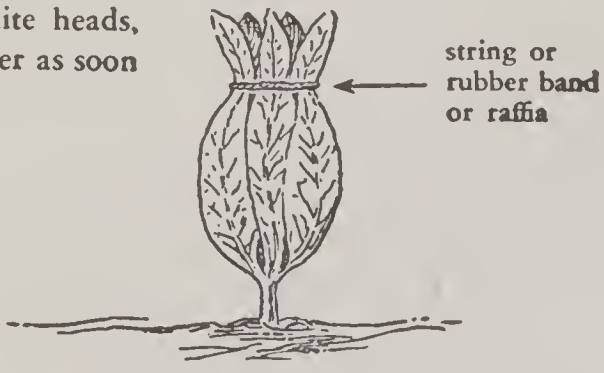
Seed. For the small garden, a packet of seeds should last for one and possibly two seasons.

Planting. Cauliflower seed is usually planted indoors for the early crop. For the late crop, it is planted outside in a special seedbed which may be an open frame or merely a foot or two of one of the regular rows in the garden. Not more than a dozen plants are needed at one time. Sow the seed in a furrow about one half inch deep, cover with one fourth inch of soil, firm, and water. If indoors, transplant the seedlings, as soon as they are large enough to handle, into small pots or another box, allowing each plant about two inches each way. These plants are then set in the garden when all danger of a hard freeze (below 28° F.) is over — about May 1. In the frame or garden row, the plants are thinned to stand about two inches apart; when six inches tall, they are ready to move to any unoccupied area. In the garden, plants should be set out about fifteen inches apart in rows which are about two feet apart. To insure a continuous supply for the table in the fall, I plant about two feet of row to cauliflower seed along with an equal amount of cabbage and broccoli about June 20 and July 20. This provides eight to twelve good plants for transplanting about a month later, and the curds should mature from September 20 to November 1.

Extra Food. So that the plants may grow vigorously, a little extra nitrogen can be used after they have been set about four weeks. A pint of liquid manure, a heaping tablespoon of some complete fertilizer, or a heaping teaspoon of nitrate of soda or sulphate of ammonia should be sprinkled around each plant.

Special Care. Protect the plants from cabbage maggot, cabbage worms, and cabbage aphids.

When the small white curd is the size of a half-dollar, tie the leaves together with string, raffia, or a rubber band to keep out the light, thus



Cauliflower—to get white heads, gather the leaves together as soon as the curds show.

bleaching the curd as it grows. If this is not done, the curd will be purplish, thus detracting from the appearance and lowering the quality. Examine the curd every three or four days to make certain that it is cut when ready. If it is left too long, it opens up and the quality changes fast.

Harvesting. Cauliflower should mature in eight to ten weeks after setting out the plants. Pull the plant up when the curd has reached its largest size, but before it begins to open up and become 'ricey.' Cut the stalk just below the curd, handle carefully, and use immediately. Use a little crisp raw cauliflower in your next salad.

Chard

Swiss chard or spinach beet is a summer green that will stand the hottest weather. Harvested correctly, plants will continue to produce leaves until frozen. The old, large leaves must be pulled off and disposed of at regular intervals. If this is done, a twenty-five-foot row planted April 25 will provide more leaves than the average family can use from June 20 to the first hard freeze. If many people seem prejudiced against chard, it is probably because they do not know how to use it correctly. Use only the young, tender leaves six to twelve inches long and throw away the older tough and tasteless leaves.

Varieties. Fordhook Giant is a dark green, much-curled leaf. Lucullus is a lighter-green variety. Rhubarb is a new variety with a green leaf and bright red midrib. I consider it more of a novelty than a better variety.

Planting. An ounce of seed should last two years. Sow the seed an inch or so apart in a furrow an inch deep. Cover it a little less than a half-inch with heavy soil and a little more with light soil. Space the rows twelve to fourteen inches apart. If you make the mistake of taking the whole plant for a meal or of cutting the growing points so the plants stop growing, you will have to replant. Seed can be sown up to August 10. Give each plant room to grow by thinning the seedlings to about four inches.

Harvesting. I believe this is so important that I repeat: for table use, cut or snap off the leaves that are six to twelve inches long. Throw away those that grew large because they were not needed; they reduce the vigor of the plant.

I have read that 'the blades of the large chard leaves are used as a pot

herb or green and the stems or midribs cooked like asparagus.' Take your choice. There is more flavor to the leaves.

Celery

Celery is not easy to grow unless you have an unusually good soil. It requires a continuous supply of food and moisture, for it must be kept growing steadily from the time the plants are set out until it is harvested. You must have good rich loam or a watering system. Celery does not take much room, as it can now be bleached with paper, and thus the rows can be planted as closely as eighteen inches. Where there is room, you can have a continuous supply — two plants or one bunch a day — from four thirty-foot rows. Two of these rows can follow some other crop, for the plants are not set out until July 10 and 30.

Varieties. There are two distinct types of celery: the so-called white (which is really yellow) and the green (which has stalks that blanch out white). The white varieties, such as Golden Plume (or Wonderful) and the old standard Golden Self-Blanching (which is about out of the picture now), have been most extensively grown because they are quick to grow, easy to blanch, and appetizing to look at. The green varieties, such as Salt Lake (or Utah) and Giant Pascal, have good quality, but are slow to grow, hard to blanch, and require special growing conditions. Seedsmen and experiment-station workers have long sought a happy medium, and recently two varieties of great promise have been introduced, tried, and found satisfactory: Masterpiece, a tall, fine-quality celery near the white type, and Summer Pascal, a short, extra-quality variety of the green type that is comparatively easy to blanch.

Planting. Celery seed is small and slow to germinate, so should be planted carefully in a specially prepared bed. A packet should produce 400 to 500 plants, all you will probably need in a season. Sow the seed in a shallow furrow one eighth inch deep and cover with a sandy soil that will not crust. Then cover with a cloth so that the surface will not wash or dry out. I use cheesecloth fastened down with hairpin-like wires six to eight inches long. As soon as the seeds sprout, the cloth must be removed. (It does not need fastening when the seed is sown indoors.) Seedlings should either be thinned out an inch apart or transplanted one and one half to two inches apart to make husky plants. When the plants are ready, they are planted six inches apart in the garden row. It takes eight to ten weeks from seeding to get a plant

ready to set out. Seed sown February 22 should produce plants for May 1; seed sown May 15 should provide plants for setting July 30. Plants may be purchased if desired. If possible, order them ahead, and provide the seed if necessary in order to get the right variety.

Special Care. Celery is thirsty and its roots are short, so if possible water before the soil dries out — soak, don't sprinkle. Celery is hungry and is one crop that must have extra food, so spread a line of fertilizer about six inches from the plants on each side. Do this two or three times while it is growing. Use nitrate of soda or sulphate of ammonia (about a pound for twenty-five feet of row) or a regular *complete* commercial fertilizer such as a 4–12–4 (three pounds for a twenty-five-foot row). Cultivate it in, but remember the shallow roots and do not hoe deeply. Then water it in and the plants will be well nourished by the next morning.

Keep the foliage covered with Bordeaux or copper-lime dust.

Get some special celery bleaching paper and some wires (there should be a wire wicket every two feet) to hold the paper tight. Put this on when the plants are about twelve to fourteen inches tall, about two months after setting out. In warm weather the plants will blanch in about ten days; the white type a few days less, the green type a few days more. In cool weather the process will take twice as long. Contrary to popular opinion, a celery plant does mature much faster in warm weather than in cool. Therefore, in order to have quality celery, it must be eaten while it is still growing. Do not wait too long for it to get larger or to blanch out whiter.

Harvesting. The plant can be pulled up and the roots cut off, or you can cut just above the ground. Be careful to make the cut low enough to leave a portion of the root to hold the stalks together. Pull off the outside stalks and use them for celery soup or flavoring.

Do not be discouraged if a planting of celery that happens to mature during a particularly hot spell goes to pieces. Strictly speaking, celery is a cool-weather crop. The new improved varieties, however, will stand the ordinary summer weather.

Corn

In warm weather, when we usually have the most corn, the best part of the natural sugars are lost within a few hours after picking. If you can have corn twenty minutes from the time it is taken from the garden

to its appearance on the table, you will know how good it can be. So if you have a fair-sized garden, plant a few rows. Unfortunately, corn returns a small amount of actual produce for the space it occupies.

Sweet corn is comparatively easy to grow. It should always be planted in blocks of two or more rows, not in a long single row. When this is done, the ears should be filled out better, particularly if rainy or windy weather prevails while the pollen is flying.

Varieties. Golden Bantam has long been known as the standard of perfection almost everywhere sweet corn has been grown. The name has unfortunately been applied to so many strains of yellow corn that it is impossible to know exactly what you may get when you order it today. The original strain is almost extinct. During the past ten years a new type of sweet corn has been introduced. It is known as 'hybrid' corn because it is a cross between two inbred strains. Seed saved from 'hybrid' varieties is useless. Golden Cross Bantam was one of the first hybrid sweet corns produced and has proved so good that today it is the standard of perfection. It differs from the original Bantam. Yield and quality are excellent and it is listed by all seedsmen.

Almost any variety of sweet corn tastes good right out of the garden, but here are my suggestions:

Time from Seeding to Picking		*Hybrid*	*Regular*
Early:	65–70 days	Seneca 60	Golden Early Market
	70–75 days	Spancross	
Mid-season:	75–80 days	Marcross 6:13	Golden Sunshine
	80–83 days	Northern Cross	Whipple's Yellow
	83–85 days	Carmelcross	Buttercup
Late:	85–90 days	Golden Cross Bantam	Golden Country Gentleman

For something extra, try Early Pearl — a white variety.

Seed. One-half pound of corn seed (a big cupful) will plant over two hundred hills. Packets vary so much in size that it is impossible to say how much you should buy. I suggest you try a quarter-pound of each kind.

Planting. Be sure to plant two rows of each variety at each planting. Make them short if necessary. Corn is a warm-weather crop, but most gardeners take a chance and make an early planting about May 1. Make the rows two feet apart for the early, shorter varieties and allow three feet for the tall, late corn. You can plant in hills or in rows; as long as each plant has about the same amount of room, either is satisfactory.

For example, thin the plants to about ten inches apart if you are using the row system, or leave four plants in each hill with the hills three feet apart. By 'hills' I do not mean a mound, but, unless the soil is heavy and wet, merely a slight depression. Plant six to eight kernels in each 'hill' an inch deep. For row cultivation, make a furrow two to three inches deep, sow the seeds three to four inches apart, and cover with an inch of soil. For a continuous supply, make one or two plantings of several varieties or several plantings of the same variety. I plant up to July 4.

Thinning. Each corn plant needs room in order to develop good, husky ears. When the plants are about six inches tall, thin out the weaker plants to about ten inches apart in the row and leave not over four plants in each hill.

Harvesting. Corn is ready to eat soon after the silk has dried and turned brown. It is not easy to select the ears just exactly when they are ready. I still have to strip down a bit of the husk when I am not certain. Even then it is hard to get all the ears just right. Usually various members of a family prefer different stages of maturity, so the variation is an asset.

Special Care. Corn smut is a common trouble. It seldom causes any great amount of damage unless it gets on the ear. It is a fungous disease causing white swellings on various parts of the plant. These grow fast, finally breaking open to reveal unsightly soft, sticky, black masses of spores or seeds. There is no cure; for prevention in the future, pick off and destroy the 'balls' before they turn black.

The corn-ear worm is a large brown or green worm that is difficult to control. By means of an oil can, a few drops of a mineral oil fortified with rotenone can be placed in the silk down in the tip of the husk. This is done immediately after pollination or when the silk begins to wither.

The European corn borer is a serious pest in many places. When prevalent, it infests many other vegetables and flowers, notably dahlias. The parent is a small, grayish, night-flying moth that lays its eggs on the under sides of the leaves. The little worms hatch out in a few days and work toward the stalk, usually aiming at the growing-point. Hence the place to direct your spray or dust is at the central whorl and the bases of the leaves. Use rotenone at five-day intervals for four applications. Start about the time the eggs hatch (find out when this is from

your state experiment station). Many growers have found the treatment worth while.

It does no good to pull the suckers from your corn plants. In fact, it has been shown to be definitely harmful, for when this is done the ears will be slightly smaller.

Cucumbers

In many places the growing of cucumbers is becoming increasingly difficult. The plants are extremely tender and are the particular object of attention from a number of serious diseases and insects. I can well remember how the four or five hills of cucumbers in my father's garden supplied the neighborhood all summer. In my own garden now I have found it possible to harvest but four or five fruits from each hill before the plants go to pieces in spite of anything I can do. Do not be discouraged if you have the same experience. It is a vegetable you should certainly try.

Varieties. Most of the common varieties of cucumber are some strain of the white-spine type. For an early variety of good quality, the old Early White Spine is hard to beat. Owing, however, to its unprepossessing appearance most gardeners prefer to grow the Straight Eight, A & C, Early Fortune, Perfection, or Davis Perfect.

Planting. A packet of seed should do you for two years; it is one of the few kinds of seeds that is just as good the second year. Cucumbers are sensitive to cold and so the seed must not be planted until the ground has warmed up — May 20. Planting in hills has long been the universal practice, but many gardeners now plant all their vine crops in rows. Make the hills or rows four to five feet apart. Unless the soil is heavy and damp, the hills should not be mounds, but merely slight depressions to catch and hold the rain, not to shed it. Sow six to eight seeds in each hill; cover with about one-half inch of soil, and firm. Just before the plants begin to run, pull out all but the four huskiest.

If you intend to grow your cucumbers in rows, make a furrow two to three inches deep and sow the seeds three to four inches apart. Cover the seeds with a little less than one-half inch of heavy soil or a little more than one-half inch of light soil. Space the rows about five feet apart and thin out the plants to about a foot apart as soon as they begin to run.

For an early crop, the seed can be planted indoors not over four weeks

before you expect to set out the plants in the garden. Plant the seeds in some container so that they will not be disturbed when set out. As the plants grow fast in a hotbed or greenhouse, it does not do to plant the seed too early. The plants should not be very large when they are set out.

Special Care. Watch for cucumber beetles, squash bugs, and aphids. Many gardeners depend upon a frame covered with cloth for protection. A special cloth known as 'Aster Cloth' can be purchased from a number of manufacturers. This is a reinforced, inexpensive cheesecloth that comes in any desired width from three to thirty-three feet in multiples of three. The edges of the cloth can be held down with soil. If a six-foot width is used, it can be left until the vines are good-sized. The cloth must be taken up at least once to weed, cultivate, and thin the plants.

Cucumbers are attacked by several diseases, any one of which may kill the plants. There is little you can do other than to keep the plants growing vigorously by proper care and protection from insects. A light coating of a spray or dust containing copper kept on the leaves will help to a certain extent.

Keep the cucumbers from going to seed. This is important, for a plant often stops growing as soon as it produces seed.

Harvesting. Pick at any stage of growth you prefer. The smaller the cucumbers are when you pick them, the more fruits the vines will produce. Search carefully for those that may be hidden by the leaves. If you miss any and they grow too large, be sure to pick them off as soon as you spot them. Pick misshapen fruits when they are small; throw them away or use them for relishes. If the vines are in good condition, the cucumbers will grow unbelievably fast and it will be necessary to go over the plants every other day.

Endive

This delicious salad vegetable — sometimes called escarolle — is more widely used each year. Whole carloads are shipped from the South during the winter to supply Northern markets, which but a few years ago hardly knew there was such a vegetable. Endive closely resembles lettuce in its requirements and habits of growth. It has a decidedly bitter flavor which some people do not like. It prefers not only cool weather when maturing, but also a cool soil; the combination should produce excellent plants. A rather damp, heavy soil is cool: if your soil

is light or sandy, do not attempt to mature endive except in late fall. The plants will stand a heavy frost, but not a freezing. Endive is a slow-growing plant, taking from three to four months to mature.

Planting. One ounce of seed will plant more than one hundred feet of row. Make a shallow furrow an inch deep and sow the seeds thickly — twenty to thirty to the foot. Cover with a half-inch of soil, and firm. Thin the plants to about ten or twelve inches apart. Make the rows twelve to fifteen inches apart. If you have a cool soil, you can plant endive almost any time from early spring to August 1. If your garden is in a hot location, you should wait until the middle of July for sowing, so that by the time the plants are heading the weather will be cool. For an early crop, the seed can be started indoors and the plants set out along with the early cabbage and lettuce.

Varieties. There are two distinct types of endive: the curled- or fringed-leaved, and the broad- or smooth-leaved. There are two or three named varieties of each type — the seed catalogue will tell which is best. Recently, upright-growing varieties of the fringed-leaved type have appeared, making it easier to tie up for blanching. Deep Heart-Fringed and Cos are the names.

Blanching. When the endive plant is almost fully grown, the leaves are gathered up into a bunch and tied near the top. This blanches the heart leaves to a beautiful yellow, reduces the bitterness, and makes them more tender. The blanching process takes from two to five weeks, depending on the temperature. During warm, muggy weather, the heart leaves quickly decay when the plant is tied, so that this process is of questionable value. Examine the crowns frequently during such weather. Prolong the season by covering some plants with hay or straw during the first freezing periods, or dig up the plants and set them in a protected frame where they can be kept for several weeks.

French Endive or Chicory. This oldtime salad plant, commonly known as Witloof Chicory, is easily grown for the green leaves or for its root as an adulterant for coffee. When grown for forcing, it is another story. Much of the product sold in our markets came, until recently, from France and Belgium. Grown exactly as parsnips, the roots are dug just before the ground freezes and the tops cut off about two inches above the crown. The roots are then stored in a cool place until wanted for forcing. When taken out of storage, the slender tails are cut off to make the roots about the same length. The dead or injured leaf stalks are

trimmed from the crown and the roots set in a trench in a box or bed of garden loam. Placed closely together, soil is added to cover the roots, but not the green tops. The soil is then well watered and dry, screened soil, sand, or sawdust is put on top to a depth of eight inches. Kept at a temperature of 55° F., tight, white heads should develop in about a month.

Herbs

Plant a few herbs in your vegetable garden, on the edge of the shrub or perennial border, or in any other corner that is not already spoken for. You will not need much room, for a little 'yarb' flavoring goes a long way.

Most of the herbs will grow wherever vegetables or flowers will, and some will grow anywhere. Determining what herbs to plant is a matter of likes and dislikes as well as trial and error. You do not really know until you try — this adage well applies to the growing of herbs in the back-yard garden and to their use in the kitchen.

The annual herbs are best planted in a row right along with the vegetables. Five to ten feet of row of each kind will probably supply more material (fresh and dried) than you can use during the year. After a year's experience, you can increase the amount of those you particularly like and cut down (or discard completely) those you do not find worth while.

The perennial herbs can be planted at one edge of the vegetable garden or in an entirely separate garden. Some of these are likely to become a pest, spreading in all directions and smothering everything in their way, so be careful where you put them.

Annuals

Most of the annual herbs can be started either early indoors and the plants transplanted to the garden, or the seed sown directly in the garden row and thinned out. All are planted in a shallow furrow an inch deep with ten to twenty seeds to the foot and covered with a quarter-inch of soil, then firmed. Grown indoors, it is best to transplant the seedlings into small pots or set them one and a half to two inches apart in the flat or bed. Make the rows fifteen to eighteen inches apart in the garden. Several varieties can well be planted in one row. Space plants eight to twelve inches apart.

Nip out the tips of most annuals to make a compact plant

Doing this **makes this** **instead of this**

Basil. Several varieties are available. Dwarf Bush is preferred by many, but the seed is not easy to obtain. It makes a small, compact plant excellent for a border of a flower garden. The small-leaved Sweet Bush Basil makes a fair-sized plant and is the variety commonly sold. Large or Lettuce-Leaved Basil is also quite common. Purple-Leaved Basil is used to color vinegar. Basil is especially good used with tomato: fresh, in tomato juice; baked, in a casserole dish with tomatoes; cooked, in cream of tomato soup; or canned, with tomatoes. Fresh or dried, it adds flavor to many other dishes.

Borage has a taste reminiscent of cucumber. It makes a fairly large plant that sprawls all over everything. It has a brilliant blue flower often used in summer drinks and as a garnish in consommé. The large hairy leaves add a delightful flavor to soup, or to spinach.

Dill grows about two and a half feet tall, terminating in flat flower heads with small yellow flowers. The fine feathery foliage is sometimes used for flavoring, but the seeds are mostly used. It is best to gather the flower head when mature but still green. When the seeds are dry, they may be rubbed off gently. While they are used in pastries, soups, and stews, they are most popular in making pickles. The fresh or dried leaves are used to advantage, while boiling new potatoes, in lamb stew, with sliced cucumbers, in a dressing of vinegar with or without sour cream, and fresh in all kinds of salads.

Sweet Fennel (as distinguished from Florence fennel or finocchio) is a tall, feathery plant quite like dill in appearance. Young plants and

leaves are used as garnishes in salad, sauces, soups, and so forth. It has a licorice flavor.

Sweet Marjoram is a bushy little plant with soft foliage. Its flavor is rather strong for salads, but it is widely used with roast lamb, pork, chicken casserole, or veal stew.

Parsley is available in several varieties, but the old broad-leaf is best for flavor and the curly-leaf for garnishing. Be sure to pot up a plant or two in the fall before the ground freezes for use in the kitchen during the winter.

Summer Savory makes a fragrant, shrubby plant twelve to eighteen inches tall. Usually sown directly in the garden, the tender tips are used fresh or dried in salads and bread stuffings. It is claimed that the fresh leaves crushed and rubbed on a fresh bee sting will relieve the pain.

Harvesting Annual Herbs. Tips of the herb plants can be used as soon as the plants are large enough to stand cutting. The volatile oils are most potent, and therefore the flavor is strongest just as the plants begin to blossom. Some kinds, such as savory and marjoram, can be cut back and will produce another crop. Or the whole plant can be pulled up or cut off. The leaves or plants can be hung up or placed on wire-mesh trays for drying, preferably in a dark, airy room. As soon as dry, the leaves are stripped from the branches and put — whole or powdered — into small airtight jars. Store in a dark, cool place.

Perennials

The perennial types of herbs can be propagated best from plant divisions, although some can be grown from seed. The seed can be planted early indoors or sown directly in the garden. These varieties should be placed on the edge of the garden where they will be out of the way or, better yet, given a corner or bed to themselves.

Chives make small, dark green, grass-like plants eight to ten inches tall (although there is a new special strain almost twice as large) that have tiny bulbs growing in clustered bunches at the base of the leaves. The clumps are separated and reset in the early spring at least once every three years. The finely chopped leaves are used for their mild onion flavor in stews, salads, omelets, and so on. Be sure to pot up a plant or two for use in the kitchen during the winter. One of the most popular of all herbs, it is especially relished by those who like the onion flavor.

Mint. There are several mints used for flavoring, but the most common

are spearmint, peppermint, and applemint. The plants prefer a rich, moist soil and must be treated roughly or they will grow all over everything. Once established, the tips can be cut freely; in fact, the plants should not be allowed to go to seed. Use a sickle to cut them back when in blossom. Spearmint and applemint are the favorites for flavoring drinks, jellies, sauces, and so on, and can be used fresh or dried. Be sure to get a good strain and set a few roots a foot apart; soon you will have a solid mat.

Sage. The common garden sage is one of the best known of the herbs. It is a shrubby gray-leaved plant growing from twelve to fifteen inches tall and spreading out to make a plant two to three feet in diameter. It can be grown from seed, although the better strains, such as Holt's Mammoth, are propagated by layers, by division, or by cuttings. The tender tips are used fresh or dried and can be cut two or three times during the season. The seed stalks should be kept cut off. Sage is a little strong for use fresh, but dried and powdered it has many familiar uses.

Tarragon. This makes a plant eighteen inches tall and twelve inches in diameter. It is propagated by dividing the plants in the spring. The tender tips may be gathered at any time and used either fresh or dried. It has a delicate flavor much like anise. The making of tarragon vinegar is the favorite use of the plant. Fresh tender shoots are used in salads, with steaks, chops, and so on, as well as in soups, stews, and sauces.

Thyme. Several species of thyme are available; some are good for ground covers between stepping-stones. All are small, rather wood-based perennials that do best in a poor, gravelly soil. The plants can be started from seed which is so small that it must be planted in special beds or flats. It is usually best to propagate from divisions or layers and set the plants about ten inches apart each way. On account of its tendency to get woody, divide and reset every two or three years so that you will have tender stems for flavoring. Thyme is used green or dried for flavoring many dishes. As it has a tendency to winter-kill, a winter mulch of leaves or straw should be used.

Harvesting Perennial Herbs. The method of picking and drying is similar to that for annual herbs. It is important to do this before they start to go by. Just before they begin to blossom is even better. Whole plants of the perennial herbs should not be pulled, nor should they be cut back too late in the season. The stems of most kinds can be cut three or four

times during the season. Material for drying should be kept in the shade so that it will retain its color and full aromatic flavor.

Kohlrabi

If you like turnip and find it difficult to grow, try kohlrabi. A member of the cabbage family, it is subject to all the troubles of that important tribe. Each plant produces a bulb-like enlargement of the stem just above the surface of the ground. It is important to use this when it is less than two and a half inches in diameter. If left longer, it will become woody and tough.

Planting. White and purple varieties are available. Seed is planted in a shallow furrow an inch in depth. Sow about twelve seeds per foot and cover with a half-inch of soil, then firm. Thin out the seedlings to four or five inches. Make the rows twelve to fifteen inches apart.

The plant is hardy, so start sowing seed as soon as the ground is ready and continue every ten days or so up to August 15. Do not plant too much at one time. I suggest twelve to fifteen feet of row at each planting. During hot weather some of the plantings may not turn out well. In this case, pull the plants out and plant something else.

Lettuce

Here is another hardy, cool-season crop that most of us would like to grow during the hot summer months. The head varieties that we particularly like are especially difficult to grow in the average home garden, even during the early spring. The Government is trying to develop heat-resistant strains, and when this is done, the thanks of all gardeners will have been earned.

Varieties. There are four distinct types of lettuce. (1) The loose-leaf varieties, such as Prize Head, Black-Seeded Simpson, and Grand Rapids. These will do fairly well, even under adverse conditions. The leaves are thin and very tender when young; if left too long, the leaves grow bitter. (2) Upright-growing varieties that make a fairly firm head under good conditions and a loose head in warm weather. Commonly called Cos or Romaine lettuce, the varieties are known as Express White Paris and Trianon Self-Folding. The plants are comparatively small at he base and grow a foot or so tall. The leaves are thick, with a fairly heavy midrib. This variety is, in my opinion, the best home garden hot-weather lettuce. (3) Butter-head varieties, such as May King, Black-

Seed Tennis Ball, and Big Boston, have been standard market varieties for thirty years. The most widely planted variety today is the White Boston or Green-Leaved Big Boston. It does not have the red tinge of the old Big Boston variety. For real quality for the home garden, there is nothing that will beat the old Mignonette, which forms a very small, compact head with reddish-brown leaves. Try also Crisp-as-Ice for quality. (4) The 'Iceberg' type is today widely grown for shipping throughout the country. It requires a long, cool growing season and good soil conditions. The varieties are named New York and Imperial. There are a number of strains of both varieties, each having certain characteristics of particular value for growing in limited areas. Unless your garden soil is above the average, I cannot recommend these except for the early transplanted crop. A new variety, the Cosberg, shows some promise for the home garden. It is a cross between Cos and Iceberg.

Planting. An ounce of lettuce seed goes a long way — over two hundred and fifty feet of row. It is sown in a shallow furrow about an inch deep in rows twelve to fifteen inches apart. Plant twelve to fifteen seeds to the foot and cover the seed with a little less than one-half inch of heavy soil and a little more than one-half inch of light soil. Thin out the plants according to the variety — about six inches for the Cos and twelve inches for the New York. The seed can be planted as soon as the garden is ready in the spring, and successive sowings made up to the middle of August. I make a planting of at least two varieties — usually Cos and Cosberg or Mignonette — every two weeks. I also try a little White Boston now and then. In the early spring I always purchase a dozen or so plants of some New York strain from a near-by market gardener.

Make your rows short. I suggest about three feet of row of each variety for each member of the family.

Special Care. Cutworms are fond of lettuce, so protect your plants before they are cut off. If the leaves are eaten and the plants not cut, it may be the climbing cutworm.

As soon as a head begins to send up a seed stock, it becomes bitter, so pull it up and throw it on the compost pile.

Melons

As it is eaten for dessert, a melon is now usually classed as a fruit, but because of its manner of growth most of us still consider this delectable crop a vegetable. Everything said about cucumbers applies to

melons except the varieties and the proper time of picking. The plants are a little more vigorous, but are subject to the same pests. Fruit maturing after the leaves begin to die is of poor quality.

Varieties. There are so many good varieties of melons that it is difficult to pick the best two or three. Bender's Surprise is probably most widely grown around New York and New England. Hearts of Gold, Delicious, and Aristocrat are others worth trying.

Picking. Whereas a cucumber should be picked before it is ripe or mature, a melon should be left on the plant until it separates from the vine when twisted a little. At that time the seeds will be mature and can be saved if desired. Different varieties of melons will intercross, but melons will not cross with cucumbers.

Onions

Onions are one of the most widely grown and universally used vegetables. They can be grown from seed, sets, or plants. In the home garden, sets and plants provide the easiest and surest method to get good onions.

Varieties. The variety you plant depends on what kind of onions you want and how you plan to grow them. Most of the sets sold are of the Ebenezer variety or so-called 'Japanese' sets, producing a mildly flavored, yellow, somewhat flattened bulb. Most of the plants sold are of the Sweet Spanish or Prizetaker varieties, producing a very large sweet onion that cannot be kept very long. Both of these are planted early — before May 15 — and mature early — July and August. The seeded varieties take a long time to mature and are a little more difficult to grow. The Early Yellow Globe is the most popular variety, although the Danvers Yellow Globe and Southport Red and White Globes are still widely planted. Of course seed for the 'set' and 'plant' varieties is also available.

Planting. Sets are small onions grown from seed planted thickly the year before. They should be small — one-half inch in diameter — for best results. Do not make the mistake of picking the largest sets, for they will go to seed without producing a good bulb. Plant them early in a trench two to three inches deep, about two inches apart in rows twelve to fourteen inches apart, and cover with an inch of soil. A quart of sets will plant from seventy-five to one hundred feet of row.

Plants are grown from seed started early indoors. These are planted in the garden early about the same distance apart as the sets, but, of course, not in furrows. One hundred plants will fill about twenty-five

feet of row. You can get them from a near-by grower or your seedsman.

Seed can be planted as early as desired. Sow in a shallow furrow an inch deep, dropping twelve to fifteen seeds per foot and covering with a half-inch of soil. Make the rows twelve to fourteen inches apart. An ounce of seed will plant over one hundred and twenty-five feet of row. The seedlings must be thinned to stand about three inches apart.

Harvesting. Any onion can be used for cooking or flavoring as soon as the bulb is sufficiently large to warrant pulling. An onion is ripe when the top dries and falls over. It can then be pulled, dried, and kept for some time. The 'Sweet' type will not store very long.

Leeks are very similar to onions in their adaptability and cultural requirements. They form thick, fleshy stems instead of bulbs and are usually planted in a shallow trench so that the plants can be more easily hilled up with soil for blanching as they grow. They are not affected by early frosts.

Varieties. There are two types — the short, thick leek, Giant Carentan or Musselburg; and the longer variety, American Flag.

Planting. The seed can be planted early indoors for growing plants to set outside or sown directly in the garden early. Make a furrow or shallow trench four to five inches deep, allowing eighteen to twenty-four inches between the rows. Set the plants four inches apart or sow the seed in a shallow furrow in the bottom of the trench. Drop twelve to fifteen seeds per foot, cover with a half-inch of soil, and later thin the plants to four inches. Fill in the trench as the plants grow. If your growing conditions are good, you will have to pull up the soil around the plants as they grow. I have seen leeks with twelve to fourteen inches of blanched stem over an inch and a half in diameter.

Harvesting. Leeks can be used as a green bunching onion any time after they reach sufficient size. To prolong the season, they may be lifted just before the fall freeze and stored like celery in a coldframe, pit, or box.

Scallions. Any onion which retains a thick stem and does not form a large bulb is a scallion. Strictly speaking, a leek is a very much glorified scallion. The Japanese Bunching Onion is commonly used for 'green' onions or scallions. Sown early in the spring in rows twelve to fifteen inches apart, there is no need of thinning. The stems are nearly twice as large as ordinary bunching onions and remain mild and sweet for some time. With a little protection of straw, they will stand over winter and produce early green onions in the spring.

Parsnips

A few parsnips are worth planting, if only for a few messes in the fall and for their extra delicious quality in the early spring after being frozen all winter. They may still be eaten after spring growth starts.

Seed. Parsnip seed is one of the few vegetable seeds that are of no value the second year, so do not buy very much. It is also very light, therefore, a packet should be sufficient for twenty-five feet. Hollow Crown has long been the standard variety, but many seedsmen now list a special variety of their own which will probably be better.

Planting. As the seed is slow to germinate, it may help to sow a few radish seeds in the same row. Plant parsnips in rows twelve to fifteen inches apart. Make a shallow furrow an inch deep, drop twelve to fifteen seeds to the foot, and cover with a half-inch of soil. The seed can be planted as soon as the garden is ready, to provide roots for eating by September 15. For a few messes in the late fall and some spring-dug roots, I plant my parsnip seed the middle or last of May. Thin the plants to about four inches apart.

Harvesting (for mid-winter use). See chapter on Storage.

Special Care. Parsnips are usually free from disease and insect injury. Some seasons wire worms attack the roots. The carrot rust fly maggots are occasionally found near the root tips. An unattractive russeting of the skin on parsnip roots is caused by certain unfavorable soil conditions. It spoils the appearance and in severe cases lowers the quality. If your parsnips are affected three years out of four, use the space for some other crop.

Peas

Peas are high in food value and a rich source of vitamins, but unfortunately they do not yield very much produce for the space they require and they are not easy to grow in most home gardens.

Peas are distinctly a cool-weather crop. They should never be planted at a time when they will mature during warm weather. They are also subject to several root diseases, and aphids find a happy and protected hunting ground in the folded leaves at the growing point of the vines.

I consider it imperative to get pea seed in as early as possible — before April 19. If a late snow wets them down, your success is almost assured. I also consider it important to plant peas in fairly new soil. Every three years I have a ten-foot strip of sod at the edge of my garden plowed up

for my peas, thus increasing the size of the plot, but for an excellent purpose.

Varieties. There are a large number of pea varieties listed in every catalogue, and all of them will be good, picked when young and cooked right out of the garden. Laxton's Progress is a real dwarf pea with large pods that are early to mature. Blue Bantam and Little Marvel are other dwarf early varieties. World's Record, Thomas Laxton, and Gradus are also early varieties which are commonly grown, and they will produce vines almost twice as long as the first three mentioned. All six of these varieties will mature within six days of each other — from sixty-two to sixty-eight days. There is no excuse for planting the inferior-quality smooth-seeded pea varieties. The wrinkled-seeded dwarf varieties will stand just about as much cold weather.

For second early varieties, Rogers Gilbo, Midseason Giant, and Dwarf Alderman are recommended in the order named. The vines will be about two feet long and mature pods will be ready in seventy-two to seventy-five days. Lincoln is another late pea of high quality, but it is listed by few seedsmen.

For tall peas, there is little choice between Alderman and Telephone. They grow from four to five feet tall and mature in about seventy-five days. Some sort of support must be provided and it should be in place when the peas are planted. Brush or chicken wire is commonly used.

Edible podded peas are now being widely advertised. The young pods are picked before the peas form and are cooked and eaten like string beans.

Planting. There is no need to go to the bother and expense of digging a trench and filling it with manure. I always make a furrow four to five inches deep, drop ten to twelve seeds to the foot and cover with an inch of soil. A pound or pint of peas will plant more than one hundred feet of row. For trellising, I suggest you plant your seed in two furrows six to eight inches apart or in one wide furrow four to five inches deep and five to six inches wide on the bottom. The wire or brush is then placed between the rows or in the middle of the trench. The rows are spaced according to the method of growing and the length of vine. Real dwarf varieties, such as Laxton's Progress, should be planted in rows two and a half feet apart. Rows of tall dwarf varieties, such as World's Record, should be spaced three feet, and the tall brushed peas given at least three and a half feet between rows. If your growing conditions are

particularly good, you should seriously consider providing a support for World's Record and similar varieties, for they will often produce a four-foot vine.

Special Care. Do not let the pods get too well filled out and become yellowish. Watch for aphids and protect the plants from cutworms. There is nothing you can do once the root rot has attacked your plants.

Pull the plants up just as soon as they are done and plant something else. I have never known of any advantage in inoculating pea seed with nitrogen bacteria before planting in the garden.

Peppers

A few pepper plants will not take much space and should produce a generous number of fruits. Many home gardeners attempting to grow peppers have found that the plants made a good growth, but did not set any fruit until it was too late in the season. The frost killed the plants before the peppers were large enough to pick. This trouble has been overcome by the introduction of better varieties.

Varieties. Sweet peppers: Early Giant, Windsor 'A,' King of the North, Early Wonder, Waltham Beauty — take your pick. All are early maturing varieties which should mean a good crop in the average garden.

Hot varieties: Giant Cayenne and Hot Portugal.

Planting. Pepper seed must be planted in a warm place and the plants kept warm (above 60° F.) until they are set out, about June 1. The plants should be set about twenty inches apart each way.

Special Care. Most peppers are red when they are mature, which means that the seeds are ripe. However, the pepper fruits can be used any time, as the flavor of the varieties I list changes very little from the time the fruit is an inch in diameter until it turns a bright red.

Pests: Except for some of the common pests, such as cutworms and aphids, there is nothing you can do to control any pest that might attack peppers. I have found peppers are practically pest-free.

Potatoes

If you have the room, by all means grow some potatoes, especially some early ones. If your soil conditions are at all favorable, you will find your own far superior to any you ever purchased. Potatoes must be protected from the many pests that may attack them.

Varieties. Each year a number of new varieties appear on the market.

There is the Chippewa and Warba for early varieties in place of the poor-quality Irish Cobbler we have had to eat for so many years. New late varieties of promise are Katahdin, Sequoia, and Sebago. The Green Mountain, however, is still the standard late variety.

Planting. Buy special seed potatoes and cut them up in good-sized pieces — they should be twice the size of a walnut with two good eyes on each piece — or get the special small seed potatoes that are planted whole. Make the rows two and a half to three feet apart. Open a furrow four to five inches deep and drop the seed pieces about ten to twelve inches apart. Cover with two inches of soil. For the early crop, plant late in April or early in May. For the late crop, plant the seed pieces between May 10 and 25.

Special Care. It does not pay to take a chance on growing potatoes without making plans to keep the plants protected from the many pests that are bound to find them. Just as soon as growth appears, the flea beetle is waiting. Then there is a bug or disease for each month — and sometimes two! Get on that copper arsenate spray or dust and keep the plants lightly covered. It isn't much of a job once you make up your mind to it, and the longer you can keep the vines growing, the bigger the potatoes are going to be. The tubers can, of course, be dug and used as soon as they are large enough to make it worth while. The early potatoes should be harvested as you need them. If the ground is wet, it is a good plan to dig the late crop as soon as the foliage dies down. Then they should be stored in a cool, fairly dry place. If the weather is favorable, the potatoes can be left in the garden for some time after the foliage dies in the fall.

If your potatoes make a large top growth and produce small tubers, the chances are your soil has too much nitrogen. Potatoes are heavy feeders, but they want more phosphorus and especially potash to produce roots instead of tops. If you grow a sufficient number of rows to warrant it, buy a special potato mixture, such as a 4–8–10 or 5–10–10.

Do not plow up your lawn to plant potatoes, for the mere growing of this crop will in no way improve the soil.

Radishes

The radish is not an easy crop to grow well because it requires cool weather and fairly good growing conditions. It is also the favorite food of the cabbage maggot for which, on radishes, there is no practical con-

trol. The regular radish varieties mature quickly — three to five weeks — and remain in good eatable condition only a few days. Therefore, sow only a few feet of row at one time.

Early radishes can be grown between rows or plants of slower-growing crops. I have suggested the use of a few radish seed sown with the slower-germinating parsnip and other seeds to mark the row for early cultivation. If desired, these can be left to size up without too greatly disturbing the other plants.

Fall and winter radishes take two to three months to mature and the winter varieties will keep some time in a good storage.

Varieties:

Quickly maturing varieties:
- Red, round: Scarlet Globe.
- Red, long: Firecracker and Long Scarlet.
- White, long: White Icicle.

Slowly maturing varieties:
- For summer: White Strasburg (white, oblong).
- For fall: White Stuttgart (white, top-shaped).
- For winter: Long Black Spanish and Black Spanish Turnip.

Planting. Sow the seed in a shallow furrow an inch deep, drop fifteen to twenty seeds per foot, and cover with one-half inch of soil. Thin the plants out according to the size of the mature radish — Scarlet Globe should be one and a half to two inches apart and the White Stuttgart three to four inches. Make the rows six to eighteen inches apart, depending on the variety.

Rhubarb

Rhubarb is one of the old standbys. Two or three plants for each member of the family should provide a generous supply for both pie and sauce Once established in a properly prepared soil, the plants should continue producing good crops for ten to fifteen years or more.

Varieties. Variety names have really meant little in the past. It has been more a matter of strain. Recently, however, a number of superior named varieties have been offered for sale, some at rather high prices. If you are not too particular, get some roots from a friend. They will probably be Victoria, Strawberry, or Linnaeus — it really does not make much difference. Some seedsmen are honest enough to admit they do not know the variety name of the roots they sell. The McDonald is the

first of many improved varieties. The improvement is mainly in the color and size of the stalks. It is now listed by a number of seedsmen and nurseries. Other improved new varieties that are sold in a limited way by a few seedsmen are German Wine, Chipman's Red, and Ruby.

Planting. Pieces of a rhubarb crown with a good healthy bud are set in the early spring in a well-prepared soil about three feet apart and three inches deep. If possible, dig in a generous coating of manure and some 4–8–10 or 5–10–10 fertilizer to a depth of at least a foot. Once the rhubarb plants are set out, it is not going to be possible to feed them except from the top.

Culture. Do not pull any stalks the spring after planting, and pull only a few off the second spring. Allow all the growth to go back into the crown to form husky roots. After the third year you can pull all the stalks you wish up to the middle of June. Seed stalks should be removed as soon as they appear. If all the stalks on your old rhubarb plants are small, it may be best to dig up some of the plants, divide, and reset. This will give you a chance to improve the soil. At the same time you will have a few plants left to supply your table while the new plants become established. A frame, box, or half-barrel, with the bottom knocked out, placed around a plant in the fall and filled with strawy manure, will provide early blanched stalks the following spring.

Forcing. Rhubarb is the easiest vegetable to force. Dig up a few plants before the ground freezes and place them in a protected spot, where they will not dry out too much, but where they will freeze. After freezing, the roots can be loosened with a pick and placed in a box or on the floor of a place where the temperature will be between 50° and 65° F. Cover the crowns with an inch or two of sand, soil, or fine ashes and keep them moist but not wet. It makes little difference whether or not there is any light. The stalks develop more color in the dark. An ordinary house cellar will do; under the bench in a greenhouse is ideal. Crowns which have been forced are not desirable for resetting in the garden.

Rutabagas

Rutabagas are much slower in growing than turnips — ninety to one hundred days. They are considered sweeter, better in quality, and better keepers. Good clean roots are not too easy to raise, so do not be discouraged. If necessary, devote the area to something else. Do not try to grow rutabagas in the spring.

Varieties. Macomber is the best white rutabaga. Improved Long Island is the most popular yellow-fleshed variety.

Planting. Plant seeds in a shallow furrow an inch deep, sow eight to ten seeds to the foot, and cover with one-half inch of soil. Thin the seedlings about a foot apart. Make the rows about eighteen inches apart.

Do not plant in the spring; sow the seed from July 1 to July 20.

Special Care. As members of the cabbage family, these crops are subject to most cabbage troubles.

Harvesting. Roots can be pulled and eaten whenever desired. The plants are quite hardy, so they can be left in the garden until just before a hard freeze. They can be stored for a long time in a cold, damp storage place. Put in a box of moist loam, they will keep for several weeks in the average garage.

Spinach

This crop is seldom grown in the home garden. With the new improved heat-resisting varieties, however, there is no reason why it cannot now be grown satisfactorily. It grows quickly and takes up very little space, for it can usually be worked in between two rows of slower-growing crops.

Varieties. There are a number of good varieties available for planting at certain seasons, but I suggest you try the Summer or Long Standing Savoy for sowing at any desired time. You will find that most seedsmen have their own special strain of this variety and it is usually good.

Planting. Spinach seed can be sown any time during the season. Planted after September 15, it will grow sufficiently to winter over if protected by hay or straw. An ounce of seed will plant more than fifty feet of row. Make a shallow furrow about an inch deep, sow ten to twelve seeds to the foot and cover with one-half inch of soil, then firm. The plants are seldom thinned, but if you want to, thin to stand about two inches apart. Make the rows eight to twelve inches apart. As the crop matures in five to six weeks, it can be planted between two rows of slower-growing crops, such as tomatoes, celery, or squash.

Special Hints. The plants can be cut and used as soon as they are large enough to warrant harvesting. Cut them just at the surface of the ground. If you do not use the plants, pull them up as soon as they go to seed.

New Zealand Spinach

This green, distinct from spinach proper, is not popular because it has not been handled correctly. Do not plant too much; try twenty feet of row at first. It makes a large plant with thickish leaves and stems and grows with a branching, spreading habit to a diameter and height of two feet or more. It thrives in hot weather when ordinary spinach will not do well.

Planting. The seed is rather large and odd in appearance. It is slow to germinate and should not be planted until the soil is thoroughly warmed — May 25. Sow the seed in a furrow two inches deep, about three seeds to the foot, and cover with one inch of soil. Thin out the plants to twenty inches apart if your soil and growing conditions are good; otherwise leave them about twelve inches apart.

Harvesting. The tips of the branches — three to four inches — are the only parts used and must be newly grown or they will be of little value. If not used within a reasonable time, cut them off and thus force the production of a new set of tips for future use. If correctly harvested and cared for, one planting will provide greens from July 15 till frost.

Squash

Don't omit squash because it takes up so much room. There are several kinds of bush squash and a comparatively new type of fall squash that yields heavily which may well be planted in the average-sized home garden.

There is so much confusion in distinguishing between squash and pumpkins that I will not further confuse you by separate listings. There is no particular reason why you should know which varieties are squash and which are pumpkins, unless you plan to save some seed. As all pumpkins will readily cross and all common squash will do the same, but the two seldom intercross, you should know something about the different varieties if you plan to use your own seed the next year. You will not be able to see or taste any difference the first season, so you do not need to worry about how many varieties are growing side by side. An easy way to identify them is by examining the stem of a mature specimen. Pumpkins (*Cucurbita pepo*) have a hard, smooth stem with ridges running lengthwise. The common squash (*Cucurbita maxima*) has a soft, spongy stem with a somewhat unevenly corrugated surface.

Varieties. Pumpkins will be identified by (P) and squash by (S).

Bush Varieties: 1. The White Bush Scallop (P) is the common summer squash of the South. It is now being grown more in the North. It is also known as Cymling or Patty Pan.

2. Summer Straightneck (P) has almost entirely displaced the old crook-necked strain. New improved strains of this standard summer squash are Early Prolific and Yankee Hybrid.

3. Italian Vegetable Marrow (P) has been much in demand recently, as people have just learned how to use it. The Cocozelle is a light-colored strain and the Zucchini is a dark strain. These are picked and used when six to eight inches long.

Vine Varieties: 1. Early fall varieties of a new type of squash that is becoming very popular because of its good quality, small size and high yield. Des Moines (P), also known as Table Queen and Acorn, is a small, smooth, dark green or orange squash with a yellow, sweet-flavored, dry flesh. Shaped somewhat like an acorn, it has a number of deep ribs. Delicata (P), also known as Sweet Potato, is the shape of a short, thick cucumber, about eight inches by four inches, with dark green markings on a smooth, cream-colored skin. Butternut (P) is shaped like a dumbbell with one bulge cut off. It is a light buff color with indistinct green markings. All these are of excellent quality and produce a heavy crop on a comparatively small vine — eight to ten feet long. Although they will keep in fairly good condition through the winter, they should be used by the first of January.

2. New superior-quality winter squash varieties. Buttercup (S) is a small turban type squash weighing four to five pounds. Quality (S) is a dark green, medium-sized (five to ten pounds) squash somewhat similar in appearance and quality to the Green Delicious, but a much better yielder.

3. Common large winter squash varieties. Blue Hubbard (S) is the largest in size of fruit and size of crop. The quality is only fair. Warted, Green, and Golden Hubbard (S) are three different strains of the common Hubbard variety that are gradually disappearing because of the introduction of varieties of smaller size and better quality. Golden Delicious (S) is a comparatively new variety of extra good quality. A cross between the Boston Marrow and Green Delicious, it retains the earliness and productiveness of the Marrow with the high quality of the Delicious. It is a deep orange color, both inside and out: a good yielder of top-shaped fruits which weigh from eight to twenty pounds.

Planting. Squash seed can be planted in hills or in rows; as long as each

plant has the same amount of space, it makes little difference. Do not make mounds for the hills unless your soil is heavy and damp, but make a saucer-like depression in which to plant the seed. Sow it as soon as the ground has warmed up — May 15 — about one inch deep. All kinds of squash can be started early indoors if desired. Plant the seed in a container of some sort so that the plant need not be disturbed when it is set out. Make the hills for the bush squash three feet apart each way. For the large squash, they should be at least eight feet apart. For the smaller squash, space the hills six feet each way.

Special Care. All kinds of squash must be kept covered with rotenone dust from the time the plants appear until they begin to stretch out in earnest — about July 15. Watch for the cucumber beetle, squash bug, and vine borer. Encourage rooting of the vines at the leaf joints by covering them with soil as insurance against the vine borer.

All the summer squashes must be used while young and tender; that is, easily penetrated by the thumbnail. If any summer squash gets beyond the eatable stage, pick it off immediately and throw it away to encourage the vine to keep producing more fruits. This is important.

Fall and winter squash can be eaten at any stage, but are considered to be at their best when mature; that is, the shell impenetrable to the thumbnail.

Do not thin out the plants too soon, in order to allow for some loss from pests. Thinning must not be forgotten, however, soon after the plants start to vine out.

Remember that the common ornamental gourds are true pumpkins (*Cucurbita pepo*) and therefore will readily cross with the summer and fall squashes. Cultural directions for gourds are just the same as for the fall squash.

Pumpkin. If you have room to grow some jack o'lanterns for Hallowe'en, plant the Connecticut Field Pumpkin. For pumpkin pie, plant Small Sugar (New England Pie) or Winter Luxury. Cultural directions and pests are the same as for the winter squash. All these varieties are true pumpkins (*Cucurbita pepo*) and will cross with the other pumpkins.

Harvesting. All squash should be harvested and put under cover before a hard frost. Frosted specimens will not keep. The vine foliage will usually protect them from the first light frosts. Squash should be kept in a dry, cold place where the air circulation is good but where they will not freeze.

Tomatoes

If staked, a tomato vine takes up no more room than a dahlia. So, no matter how small your garden may be, there should be room for several tomato plants. No crop is easier to grow, and none will return more eatable produce for the space it occupies.

Varieties. It is a rare seedsman who lists less than twenty varieties, and a few list more than fifty. It is not easy to pick out the best three or four varieties, for custom and growing conditions have made different colors, sizes, and shapes popular even within the limits of one state. Research workers have increased the confusion by producing improved strains of most varieties as well as entirely new varieties. Earlier ripening, better quality, and disease resistance have been the points stressed in this intensive search for a better tomato.

Early Varieties: For flat culture, the Victor (or Bounty) tomato is recommended in the North. This is a dwarf (determinate) variety making small plants that can be planted two feet apart. It is not recommended for staking.

For staking, Comet is now a standard trellis tomato. Its culture is spreading rapidly. It has a small, round, red fruit of fair quality.

Main Crop Varieties: Rutgers, a new variety of good size, color, and quality; Marglobe, a vigorous, large, disease-resistant variety. Fruits are large and of fair color and quality. Both these varieties may be grown flat-culture or staked.

Yellow tomatoes are becoming popular because of their bright color and low acidity. They come in various shades of yellow as well as in different shapes and sizes of fruit. Mingold is a new dwarf (determinate) variety recommended for flat culture. Golden Globe and Golden Queen are two regular yellow varieties listed by most seedsmen. They can be grown either flat or staked.

Small-fruited varieties are easy to grow and bear a large crop of good-quality fruit. They can be grown either flat or staked. The variety name describes the fruit. You can get Red Pear, Red Plum, Red Cherry, Yellow Pear, and Yellow Plum.

Planting. Tomato seeds are usually planted indoors six to ten weeks prior to the time the plants are set in the garden. Many back-yard gardeners take pride in raising their own tomato plants each year, even to having all the window sills on the south side of their homes filled with pots or long narrow boxes of tomato plants every spring. Good tomato

plants of the varieties they want to grow are almost impossible to get. Market gardeners hate to be bothered and often refuse to sell a dozen or two plants, and few professional plant growers sow any new varieties, because most of the demand is still for the old standard ones.

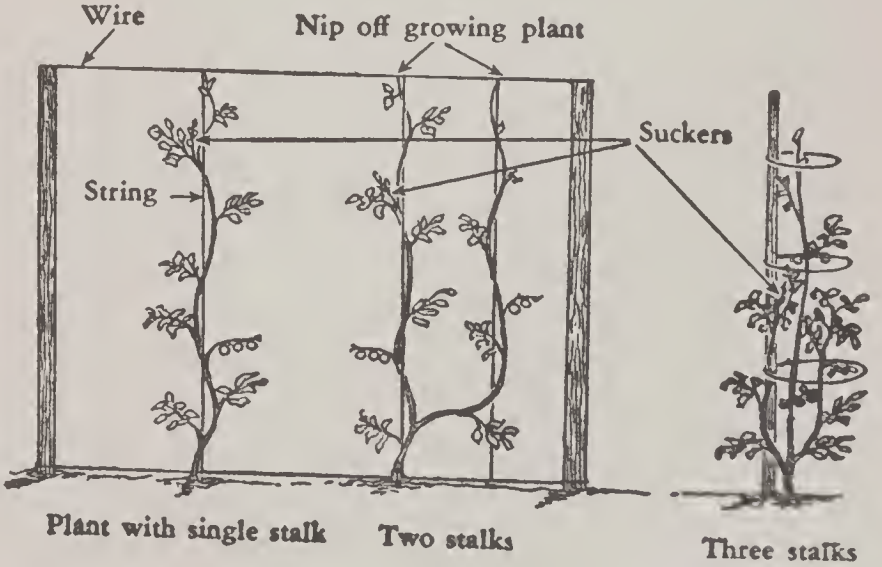
Pot-grown plants will not be checked when set out in the garden. A four-inch pot makes an ideal size and should produce a good stocky plant. If your plants are in a flat or bed, 'block' them out about a week before transplanting by cutting through the soil with a sharp knife halfway between the plants. This cuts the long roots and stimulates the growth of many fine roots. Then, when the plants are taken out, a good block of soil comes with each plant and clings to the roots.

If you have a fairly long growing season — no frost before October 15 — you can plant your tomato seeds in a short row in the garden or in a protected frame about May 15; thin them out to four inches apart and transplant when six to eight inches tall.

Tomato plants should not be set out until all danger from frost is over — May 25. The spacing of the plants depends entirely on the variety and the manner in which you plan to grow the vines. If your garden area is limited, you should plan to tie up the plants. Several methods are followed by back-yard gardeners in my neighborhood. Some use husky stakes similar to bean poles, only they are about five feet above the ground. The plants are tied to these poles every foot or so with soft twine, raffia, or strips of cloth. Others make a trellis by erecting two or more heavy stakes about ten feet apart and running a heavy wire (Number 9 or larger) between them about five feet high. A lighter wire or

In training tomatoes to string or stake, remove all suckers* when they are a few inches long.

*A sucker will grow at each leaf joint. Nip it out before it grows large.



string is also stretched at the ground surface or a foot above. A three-ply jute (soft) twine is then tied to the top wire and fastened taut to the lower string or wire. As the plants grow, the stalks are pruned of side shoots and then twined around these strings for support. Still others make an A-shaped support with vines on either side. A few still use the old barrel hoop about eighteen inches from the ground. It all amounts to an attempt to get the fruit off the ground where it will be comparatively free from insect and disease pests. The 'trained' tomatoes are usually earlier, firmer, cleaner, and better-shaped than fruit grown on plants allowed to sprawl over the ground. This 'training' means more work, for the vines must be attended to at least once a week. When the plants are set, you must decide how many stalks you are going to take from each plant. Some allow only the main stalk to grow, and remove all the side shoots or suckers as fast as they appear. Others allow one or more of these suckers to develop into stalks, from which in turn the side shoots must be removed. Take your choice. I suggest that you decide by trial which system you prefer to adopt. You will find that a side shoot or sucker will appear at each joint formed by a leaf stem and the main stalk; by no means remove a leaf stem as long as the leaves are green.

If you decide to let your plants grow flat, I suggest that you mulch the plants soon after they are set with three or more inches of hay, grass clippings, or some similar material. This will keep the fruit cleaner, provide a more even supply of moisture, and keep the weeds down.

For extra early tomatoes, get some kind of plant forcer and set the plants about three weeks earlier than usual. For further information see Chapter IX on Growing Early Vegetables.

Special Care. The trained tomatoes will also benefit from a mulch of some sort; it will help to provide an even supply of moisture and keep the weeds down. Pruned tomatoes will stand more forcing than 'flat' ones, so an extra side dressing of complete fertilizer should help.

Watch for the cutworm, flea beetle, aphids, leaf hopper, and large hornworms.

Harvesting. If the tomato fruits are picked before they are fully ripe, then allowed to ripen in the pantry, they will be firmer — particularly in hot, damp weather.

At the end of the season, the green tomatoes should be harvested before a heavy frost and kept in a shed or the garage in a shallow pile or in boxes. Many of the fruits will ripen over a period of several weeks. The quality

will, of course, not be so good as that of vine-ripened fruit, but the tomatoes will be better than those in the store shipped a thousand miles or so. I have found that green tomatoes picked and kept in this way do just as well or better than when the whole vine is pulled and hung up.

Turnip

Good-quality turnips are difficult to grow. I do not recommend that you even try to grow a spring crop, owing to damage from the cabbage maggot and to poor quality resulting from the hot spells usually experienced when the crop is maturing. Seed planted after July 25 should produce satisfactory roots under good growing conditions. Turnips take from sixty to seventy-five days to grow.

Varieties. Purple-Top White Globe is well described by its name and is the most popular variety. Milan and Snowball are two other varieties worth trying. Yellow Globe is a yellow-fleshed variety of only fair quality.

Seven-Top Turnip or Shogoin is grown extensively in the South for turnip 'greens.' It can be grown just as well in the North in the fall by those who like the mild-flavored tops.

Planting. Sow the seed in a shallow furrow an inch deep. Plant ten to twelve seeds to the foot and cover with one-half inch of soil. Thin the plants to stand four to five inches apart. Plant the seed in the spring before April 25 or not at all. For the fall crop, sow the seed from July 25 to August 10. Make the rows twelve to fifteen inches apart.

CHAPTER

VII

SMALL FRUITS

Supplement Your Vegetable Crop

No purchased fruit can equal the flavor of that grown in your own back yard. This is largely due to the fact that the fruit can be left on the plant until it is almost mature.

Tree fruits take up considerable space and are difficult to protect from the many insects and diseases that attack them. Strawberries, grapes, blueberries, and the brambles take up little room and with the proper attention should produce luscious crops.

Strawberries

Strawberries are one of the few fruits that the back-yard gardener can still grow without expecting serious trouble from insects or diseases. Given a fairly good growing season, a satisfactory crop should be obtained, provided the right varieties are chosen.

Since varieties of strawberries well suited to one section may perform poorly in another, it is not safe to depend entirely on the descriptions given in the nursery catalogue. As is the case with all kinds of popular fruits, flowers, and vegetables, a number of new variety names appear each year in the up-to-date lists. It takes at least ten years after a new variety is introduced before its comparative worth can be determined.

Standard Strawberries

These berries are biennial; that is, you set the plants one year and pick the crop the following spring. The picking season of a variety usually lasts about two weeks, and although there are so-called early, mid-season, and late varieties, the strawberry season in your garden will be less than a month, even with three or four varieties. The longest period I have picked in my garden was from June 15 to July 5.

Varieties. As I can write only from my personal experience, the follow-

ing descriptions and recommendations apply only to Massachusetts and surrounding states. For information concerning the best varieties for growing in your vicinity, write to your state college.

Howard 17, also known as Premier and Number 7, has been the most widely planted strawberry in this section of the country for over twenty years. The Howard has most of the points of an ideal strawberry, and none of the new varieties grown beside it for three successive years have been able to equal it. A vigorous grower, with a tendency to produce too many plants, it is a heavy cropper of fair-quality fruit over a long season. I still recommend it as the surest producer under average conditions. Grown under only fair conditions, no other strawberry will compare with it. If you have good growing conditions, you will probably prefer Fairfax, Dorsett, or Catskill, as the fruit of these varieties is larger, and looks and tastes a little better. Howard 17 is one of the earliest varieties.

Catskill rates as my second choice. It has taken its place as the best mid-season berry for the Northeastern States. This variety was produced by crossing the Marshall and Howard varieties, certainly a very promising parentage. It is a heavy producer of good-quality, good-looking fruit, starting to bear about a week later than Howard. It is to be especially recommended on a heavy soil.

Dorsett is a recent introduction of the United States Department of Agriculture. It is an early variety, maturing about a week after Howard. The berry is large, with a good bright color and an excellent flavor. I have seen very good and very poor crops of Dorsett in back-yard gardens with no apparent explanation.

Fairfax is another introduction of the United States Department of Agriculture. Similar to Dorsett in its variable growth, the berries and plants are entirely different. Fairfax produces a beautiful large, dark-red berry of excellent quality. Its color gives it the appearance of being overripe. It is a mid-season variety, about a week later than Howard. Fairfax is not a heavy plant producer and it is also a shy bearer.

Chesapeake is an old variety. It is so variable in its growth that commercial growers have had to give it up, in spite of the fact that it has long been the best-quality late variety. The berry is one of the most beautiful of all the strawberries and it tastes as good as it looks. The plants are not very hardy and should be well mulched.

Northstar is a new introduction of the United States Department of Agriculture that has not been tried sufficiently to demonstrate its real

value. It appears to be of excellent quality, large size, and more productive than Dorsett and Fairfax. It is the first promising late variety to be introduced since the Chesapeake.

There are a number of new varieties that have not been on the general market as yet, but which look good on various trial grounds. A large number of experiment stations as well as the United States Department of Agriculture are carrying on rather extensive breeding work with strawberries. A postcard to your state college should bring you the source of plants of these varieties.

Plants. Buy your plants from a reliable nursery. It is seldom convenient to take them from your own bed; you will hate to sacrifice the necessary number of plants for establishing the new bed. The plants should be less than a year old, medium in size, and with a larger root system than they have crown and top. Keep the roots from drying out until they are planted.

Soil and Fertilizer. The soil and food requirements are about the same as for vegetables. If you can grow good vegetables, you should be able to grow excellent strawberries. Prepare the soil and apply the lime and fertilizer as I have suggested for your vegetables. Do not use any fertilizer on the plants in the spring just before picking.

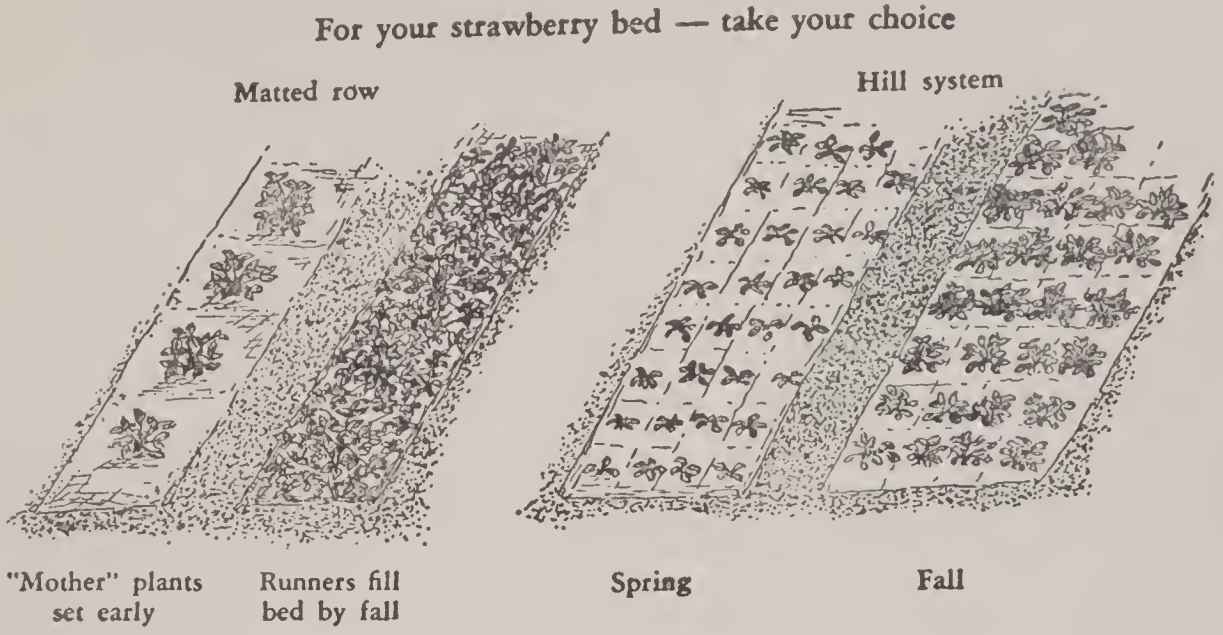
Planting the Bed. As the bed must be left over the winter and spring, it will be necessary to make it in a part of the garden where it will not interfere with fall or spring operations. Early spring is the best time to set the plants. Late-set plants are likely to suffer from lack of moisture and will be slow in recovering from the shock of transplanting. All plants should have the roots pruned to about four inches in length just before they are set.

In setting the plants it is important to be sure that they are planted at just the same depth as they have been growing. It is desirable to spread the roots out in the hole and to firm the soil about the roots so that no air spaces are left.

A bed set in the late summer will have to be of plants potted the previous spring. This makes the cost of a late-planted bed expensive.

Methods of Planting. The system of planting you follow will depend upon the amount of hand work you are willing to put into the care of the bed.

The *matted row* is the method commonly used by commercial growers. It will provide the most berries with the least amount of work. Under



this plan the plants are set eighteen inches apart in rows spaced from three to four feet apart. The runners are allowed to set where they run, although if the variety is an exceptionally vigorous plant-maker, it will be best to thin out plants that set too close. A path about a foot wide must be kept between the rows by cutting off the runners. If just one row is planted, you will have to keep the runners cut back so that they will not interfere with neighboring crops.

The *hill* system takes the most plants and the most labor. In this method, the plants are set twelve to fifteen inches apart each way in two, three, or four rows, then eighteen inches are allowed for a walk. I prefer a bed four rows wide, which allows working on two rows from each side. All the runners are cut off as soon as they start. This system should produce the largest and best-quality fruit.

Care the first year consists in keeping the weeds down and the plants trained or runners cut, depending upon the method you have decided to follow.

Mulching the bed is desirable to keep the plants from heaving during the winter. Cover the bed with an even coat, about three inches deep, of straw, marsh hay, seaweed, or other course material that will not pack. This should be put on after the plants have stopped growing, but before the first hard freeze.

Care the second year consists of removing the mulch as soon as all danger of a hard freeze is over. It is possible to delay ripening of the berries by

leaving the mulch on a week longer. This is an advantage if your bed is located in a spot where a late frost may kill the early blossoms. Get down on your hands and knees to do a good job of removing the mulch. Take off just enough to allow the plants to come through easily and at the same time pull out any weeds that are starting. The mulch may have to be loosened up around the plants; it will conserve the moisture, keep down the weeds, and keep the fruit clean.

Strawberry Pests. You can do little to control most of the pests that may attack your strawberry bed. Set healthy plants and take good care of them.

Treatment of Bed After Harvest. Dig or plow the bed as soon as the last berry is picked, then fertilize and plant some vegetables.

It seldom pays to try to keep a bed over another year. Set a new bed each spring.

Everbearing Strawberries

These berries are rightly called everbearing because the plants persist in sending out blossoms almost continuously from the time they start to grow. Plants set in April or early May must be carefully watched in order to keep all the blossoms picked off until the last of July. Then the berries are allowed to mature and continuous picking should be possible until a freeze stops the persistent plants from sending out any more blossom clusters. Some gardeners mulch the bed for the winter and pick an early spring crop several days before any of the standard berries are ripe. I prefer to treat the everbearers as annuals, setting a new bed each spring and plowing it up with the rest of the vegetable garden the next spring.

Everbearing strawberries are not easy to grow and will, therefore, not for some time become common, despite their excellent flavor. Most everbearing strawberry beds have been failures either because the growing conditions were not good or because the plants were not given sufficient attention.

Varieties. There are several varieties of everbearing strawberries listed by the plant growers. I have had the best results from Gem. Although the berries are small, the plants bear a heavy crop and the quality is of the best. Mastodon is the favorite with many because of its large size. I have lost all my plants of this variety for the past three years from mosaic, a virus disease for which there is no control or preventive as yet known. Wayzata is another variety with a large berry, but it is such a poor plant-

maker that the plants to set a new bed are expensive. Green Mountain is a patented variety, but plants are quite reasonable, for it is a strong plant-maker. The berry is long and pointed, quite different from the other varieties. It is late to mature, but the quality is excellent.

Soil and Fertilizer. If you can grow good vegetables, you should be able to grow good everbearing strawberries. Follow the recommendations for lime, manure, and fertilizer that I suggest for growing vegetables. In addition, I recommend a side dressing of the complete fertilizer when the first berries begin to ripen. Use about four pounds to each hundred plants; spread it carefully between the plants and cultivate it in. Unless the soil is fairly well supplied with moisture, a sprinkler is quite necessary for use during dry periods. The plants must be kept growing continuously in order to have the vigor to produce a good crop of large fruit.

Planting. I order my plants and get them set just as soon as the garden is plowed, usually by April 15. The everbearing plants must always be planted by the hill method. In this system the plants are set twelve to fifteen inches apart each way in two, three, or four rows. I prefer a bed four rows wide, which allows working on two rows from each side. All the runners are cut off as soon as they start to grow. I have found it best to buy new plants each year.

As with the standard berries, the plants should be carefully set at the same level they grew and with the soil firmed around the roots. If the roots are long, they can be cut to about four inches for easier planting.

Special Care. As soon as growth starts, most of the plants will send out a cluster of blossoms along with the first new leaves. These blossoms must be nipped off and none allowed to grow until the plant has a thriving top husky enough to produce a crop of big berries. You will find it necessary to go over each plant carefully twice a week in order to keep the blossoms and runners from developing.

Under good growing conditions the plants will have almost covered the ground by the first of August. The fruit takes about ten days to mature from the blossom, and a good bed will be at the peak of production from August 20 to September 15. Then most of the plants stop throwing out any flower clusters until a warm spell in October will again bring them back to life. The first heavy freeze usually spoils a number of large berries. I have had berries in the middle of November, but not with much flavor.

Pests. There are few pests that attack everbearing strawberries that

you can do much about. If crickets or grasshoppers eat holes in your berries, you can control them by broadcasting the Paris green-bran mash. (See page 177.)

Grapes

Although grapes do not readily fit in with the cultivation of a vegetable garden, they are one of the few fruits that can be raised in the back yard without too much trouble. A trellis or an arbor may be used to advantage to separate one part of the yard from another, to hide an unsightly view or to add to the attractiveness of the garden area. A fence or side of a building may offer a place for the vine, but some solid support must be provided to hold it when laden with fruit.

Grapes are easily grown, do not require much room, and are ornamental, yet many people persist in buying grapes that have been shipped several hundred miles.

Varieties. The choice of varieties of all kinds of fruits to plant in the home garden is not easy to make. I suggest that you plant at least three varieties, choosing different colors and flavors. Here are a few in their approximate order of maturity:

Van Buren. The earliest black grape with clusters medium in size but compact; berries are a little smaller than Concord, but of superior quality. It is two weeks earlier than Concord.

Fredonia. A new second-early black grape producing large high-quality berries in medium-sized, compact bunches.

Portland. The earliest white grape. The berries are large with a yellowish tinge and are borne in good-sized clusters. The quality is good.

Delaware. This small, red grape is usually ranked as the very best in quality of our American varieties. It is being supplanted by red-fruited varieties, such as Caco, with larger bunches of larger berries, but inferior in quality. It is unfortunately a weak grower.

Worden is an old variety, one of the best-known seedlings of Concord, which it resembles in many respects. The advantages are that it ripens a week earlier, the bunches are more compact, and the berries are of better quality and size.

Niagara has been the best-known and most popular white grape for many years, and is still the standard for comparison. It is a little late in maturing for some sections, just a few days before Concord.

Concord. This is one of the most remarkable varieties of any fruit in its

outstanding success over a large part of the country under varying conditions. The vine is vigorous, hardy, productive, and comparatively free from pests. It is late in ripening and the bunches are loose. The quality is none too good, compared with the other varieties listed above.

Care and Cultivation. Grapes must have full sunshine. Prepare the soil as I have suggested for vegetables, using manure, fertilizer, and lime in a square or circle of at least ten square feet for each plant. Each spring spread a light coating of manure around each plant, with a cupful of complete fertilizer the first two years and a quart each year thereafter. If no manure is available, mulch the plant with grass clippings, hay, or peat, and apply a cupful of complete fertilizer for the first two years and one and a half quarts each spring following.

Planting. Strong one-year-old vines are preferred, although if you know the nurseryman to be reliable, two-year vines will be better. As is the case with asparagus roots, the best plants are frequently sold the first year and the poor ones grown on another season to size them up. There are no special precautions to observe in setting out the plants. Cut the roots to about six inches long, spread them out, and then firm the soil around them. Plant the vine an inch or two deeper than it was in the nursery. After setting, cut the top severely, leaving only two buds on a single cane.

The second spring, cut back the canes, leaving two buds on not more than three canes.

The third spring, and thereafter, the annual pruning should be done before the growth starts, any time during the winter or very early spring. Just how best to prune your grapevines depends upon the size and shape of the support on which they are growing, and upon your particular desires.

Pests. There are a number of common pests that may attack your grapevines. Few of them are troublesome more than one year out of three or four. I suggest you spray with a Bordeaux-arsenate or neutral copper-rotenone, or dust with a copper-lime-arsenate or copper-rotenone. The first application should be made when the shoots are a foot long, the second just before the blossoms open, and the third when the grapes are the size of peas. A paper bag tied over each cluster when the fruits are the size of large peas will protect the grapes from injury by insects and birds.

Brambles

raspberries (red, black, and purple), blackberries, loganberries, dewberries (youngberry, boysenberry, nectarberry)

The bramble berries are great favorites, but are so perishable that we must grow them in our own garden if we ever hope to know their real flavor. To be shipped any distance, they must either be picked before they are ripe or be of a tough, poor-quality variety. Quick freezing and canning make it possible for us to enjoy these berries out of season, but the real garden flavor is lost.

The bramble berries are not easy to grow. Under favorable conditions most of them make a vigorous growth, and constant attention is required or you will really have a 'bramble patch' in your back yard. An increasing number of pests make the culture of most of the brambles uncertain. Winter injury is also a serious problem. If the available land is limited, another point you must consider is the fact that all the brambles return a comparatively small amount of fruit from the area they occupy.

Raspberries

Red Raspberries. These are the most popular brambles grown in the back yard. Modern varieties must have good resistance to the mosaic disease in order to survive, and to be attractive they must be large in size. Unfortunately, in obtaining these two traits, the real raspberry flavor is often lacking.

Varieties. The Latham variety has been standard for almost twenty years. A vigorous grower, it is fairly hardy and somewhat resistant to mosaic. The fruit is large, but inclined to crumble. Although a number of 'improved' varieties have been introduced since 1920, Latham is still the standard red raspberry and most likely to be satisfactory under average conditions.

Newburgh has replaced Latham in some sections. The berry is as large as the Latham and the quality is better. It has a tendency to grow too tall, thus requiring support or else the weight of the fruit will bend the canes to the ground.

Taylor is a new red raspberry that is as vigorous a grower as Newburgh, but does not require support. Size and quality are better than Latham. It has not been grown for a sufficient number of years to demonstrate its real worth.

The New York Experiment Station has a number of promising vari-

eties, one of which may prove to be what we need: a variety that is (1) winter hardy; (2) resistant to mosaic and other diseases; and (3) as good or better than the old Cuthbert in quality.

Everbearing red raspberries are varieties that bear fruit on the new young canes in the fall. The following spring the same canes branch and produce a crop like other varieties. They are not too reliable and I cannot recommend them for planting in quantity. Saint Regis (or Ranere) is an old variety that has been standard for many years. Indian Summer is a new variety from the New York Experiment Station. The fruit is large and of good quality, but in some localities the berries ripen too late to be of much value. Unlike everbearing strawberries, the everbearing raspberries cannot be treated as annuals.

Pruning. The roots of red raspberries may live for many years but the canes are biennial; that is, the roots are continually sending up suckers which make their growth one season, bear their fruit the second year, and then die. These old canes must be cut out as soon as they have produced their crop or during the following winter. Before the new growth starts each spring, remove all weak, spindly canes, all old ones, and those that are outside the rows. As soon as spring growth has started, cut out all the dead wood.

Black Raspberries. Black Caps are not as common as the red-berried kinds. They usually yield better crops and are unexcelled for making jams and jellies. All standard varieties, however, are severely damaged by mosaic and other bramble diseases. As Black Caps are not very well known, there is little demand for either the berries or plants.

Varieties. Plum Farmer is an old variety that has proved most satisfactory for over forty years. Cumberland is another old variety that has been widely planted. Both are very susceptible to disease and cannot be recommended for planting.

Logan and Shuttleworth are two new, disease-resistant varieties which show considerable promise, and are probably the best. I have not seen them growing, but have heard some very promising reports concerning the size and quality of the berries and the disease resistance of the plants. The New York Experiment Station has some promising seedlings; among those already available are Bristol, Naples, Dundee, and Evans. It will take several years to determine which of these can be recommended for general planting.

Purple Raspberries. These berries are the result of crosses between red

and black varieties. They are heavy bearers of berries which are similar to the red raspberries in appearance and flavor, but distinctly purple in color. They are not so hardy as the red varieties.

Varieties. Sodus is a cross between the new Dundee and Newburgh varieties. It should replace the old standard variety, Columbian, of which practically all available stock is diseased. Sodus is the heaviest bearing of all raspberries, producing a large, firm berry of good quality. Marion is a new purple raspberry of great promise that has not been grown long enough to provide a satisfactory trial.

Pruning Black and Purple Raspberries. These varieties should be headed back by pinching off the tips of the growing canes when they are two to two and a half feet tall, which will usually be about harvest time. This will induce the canes to branch out, producing strong laterals near the ground. These, in turn, must be pinched back a few inches in the early spring. Old and weak canes should be removed, as with red raspberries.

Cultivation of All Raspberries. If you can grow good vegetables, you should be able to grow good raspberries. Prepare the soil and apply manure, fertilizer, and lime as I have suggested for your vegetables. For food each year I suggest the application of a mulch of barnyard manure in the late fall. If this is not possible, make the regular application of complete fertilizer in the early spring as recommended for vegetables.

New canes must grow and old canes must bear their fruit during the season when rainfall is usually light, so that an abundant supply of moisture is important, yet the plants will not do well in a heavy soil. Continuous shallow cultivation to keep the weeds from getting a start is also important.

Raspberries are propagated by transplanting suckers. A new bed should be started in the spring as early as possible. In the large garden, plants are set two to three feet apart in rows six to eight feet apart. The plants will soon fill in and you will have to cut down the suckers ruthlessly to keep the rows the proper width. In the small back-yard garden, it makes little difference how the bed is kept so long as the pruning rules are followed and each cane is allowed sufficient room.

Winter-killing is one of the most serious troubles of the bramble grower. Abundant autumn rains or too much nitrogen may cause a soft growth susceptible to winter injury. Fertilizer, such as poultry manure and chemical mixtures high in nitrogen, must be used with moderation.

Pests. Raspberries are subject to a number of serious diseases and insects. I suggest that you (1) cut out immediately all canes that show any sign of wilting or a crumpled abnormal leaf growth with the tip leaves mottled yellow and green; (2) spray or dust thoroughly with a Bordeaux-arsenate, sulphur-arsenate, copper-lime-arsenate, copper-rotenone, or sulphur-rotenone, three times: when the leaves are almost fully out; just as the first flowers open; and again when the berries are the size of small peas.

Blackberries

These berries have never been very popular because of (1) the large number of coarse thorns on the plants; (2) the poor quality of the old varieties; and (3) the poor keeping qualities of the new varieties. All blackberries are vigorous growers and must be kept within bounds or they will not only crowd you out, making it difficult to pick the fruit, but they will crowd each other and make a dense thicket.

Pruning. In the spring take out old canes and all weak growth, leaving husky, well-branched canes at least a foot apart. Cut back all the side branches to about twelve inches. Starting the middle of June, pinch back the suckers as soon as they are three feet tall.

Cultivation. Same as for raspberries.

Varieties. Eldorado is an old standard variety still recommended for general planting. Alfred is taking its place in some sections. The core is smaller, the seeds are not so objectionable, and the quality and productiveness are good. Early Harvest is an early variety of fair quality. Blowers is an old variety still planted in some sections.

Loganberries

The loganberry is frequently heard about because of the jars of juice, jam, and jelly that are to be found on the shelves of our grocery stores. This berry is an oldtimer, for the seed was planted in 1889 by a Judge Logan of Santa Cruz, California. At first he thought it was a cross between a trailing blackberry and a red raspberry, but it is now considered merely a red-fruited variety of the Pacific Coast trailing blackberry. The loganberry is extensively cultivated along the Pacific Coast up into British Columbia. It is not to be recommended for planting in most of the Central or Northern States.

Dewberries

These berries are best described as trailing blackberries, and often grow along the railroad tracks and other places where there is little or no soil. When grown under such conditions, the berries are insignificant, but given a chance and supplied good growing conditions, many strains produce large berries of good quality. Cultivated varieties are not hardy in the North, but are grown throughout the South and West. The plants form vine-like canes which must be tied up to stakes or a support of some sort.

Varieties. Lucretia has been the standard variety for many years.

Youngberry. This berry is an improved dewberry supposed to be a little bigger and a little better. A Thornless Youngberry is listed by some nurseries. Its advantage is obvious, provided the size and quality of the berries are the same.

Boysenberry. This glorified Youngberry is being extensively advertised by many nurseries. Its actual hardiness in the Northern States is not known, in spite of the statements made in some of the advertisements. A Thornless Boysenberry is also listed by one or two nurseries.

Nectarberry. This may be described as a new super-boysenberry. It is claimed to be over an inch in diameter and two inches long, with a truly remarkable flavor.

Cultivation. Planting of these berries where the temperature goes below zero entails considerable risk. In some of the milder sections of the North, such as Cape Cod, they may be grown successfully with ordinary straw covering. In other places the vines should be laid down and covered with soil before the ground freezes.

Set the plants four to five feet apart in rows six feet apart. If each plant is kept tied to a separate stake six to seven feet tall or tied to a wire trellis three to four feet high, pruning and picking will be simplified.

Pruning is best done after the berries are picked. The old canes are removed entirely. In order not to injure the new shoots, it is usually necessary to cut the old canes into short pieces. In the spring, after the mulch is removed, three to four strong canes are tied to the support.

As these berries sometimes do not fruit well, owing to poor pollination, I understand it is desirable to plant more than one variety in a bed.

Blueberries

Since the boxes of large cultivated blueberries appeared on our markets some ten years ago, there has been an increasing interest in their culture.

The high cost of the plants has discouraged many back-yard gardeners from setting out a blueberry patch. With the great increase in the production of plants, prices have been reduced and a ten-dollar bill will provide a good-sized patch. Because of the beautiful fall foliage of the blueberry, many plants are now being used to advantage to supply a bright spot in a planting of shrubbery.

Soil. Many gardeners have the idea that the plants require very special soil conditions. The ideal blueberry soil is fertile, has a continuous supply of water, is well drained and aerated, is well supplied with organic matter, and is acid (pH 4.0 to 5.5). This description closely parallels the requirements for the growing of vegetables, with but one exception. Blueberries must have an acid soil. This, however, is not too difficult to obtain right in your own vegetable garden. Before setting out your blueberry plants, have a generous supply of very acid peat or leaf mold on hand, at least a bushel for each plant. When the hole is dug for each plant, put a bushel of the topsoil in a pile and mix it with the bushel of peat. Take another bushel and a half of soil from the hole and carry it off or scatter it around. Set the plant with at least six inches of the peat-soil mixture under it and the remainder of the two bushels around it. Then apply a mulch of two to three inches of the peat on the soil around the plant or, better yet, over the entire patch.

Little fertilizer will be required the first two years. After the third year, broadcast your regular complete vegetable fertilizer around the plants, using about a quarter-pound per plant. Gradually increase this amount until the sixth year, when a half-pound per plant should be used.

Do not use any lime or wood ashes near your blueberry plants.

Varieties. It is advisable to plant at least three varieties in order to insure proper pollination.

Several varieties of cultivated blueberries are now obtainable from a number of nurseries. They are largely the result of the work of Miss Elizabeth White, one of the pioneers of the culture of blueberries, and Doctor Coville, an employee of the United States Department of Agriculture. Work with blueberries has really just started; large acreages are already planted in New Jersey and Michigan. Massachusetts is conducting experimental work at the Cranberry Station at Wareham.

The following varieties are listed in the approximate order of maturity. All are recommended for the home garden: (1) Cabot; (2) Pioneer; (3) Rubel; (4) Concord; (5) Jersey; (6) Stanley; (7) Wareham.

Planting. Set out two- or three-year-old plants as early in the spring as possible. They should have a good-sized ball of earth around the roots. Place the plants about an inch deeper than they were in the nursery. Prepare and fill the hole as suggested in detail under *Soil.*

Cultivation. Keep the weeds down. Use the mulch as suggested and you will not have to bother with any cultivation.

Pruning. This is most important. The plants cannot be left to grow as they will, or you will be disappointed in the crop. Prune in the winter or early spring. Do not allow any fruit to grow the first two years. The purpose of the annual pruning is to induce the bush to send out vigorous new shoots. Cut out old bushy branches and all weak, spindly shoots. Remove crowding branches to open up the plant.

Improving Wild Blueberries. To improve an established patch of native blueberries, the following suggestions are given:

(1) Remove as many trees and bushes as possible, to let in the sun and air.

(2) Prune the old bushy branches and the weak, spindly shoots.

(3) Fertilize around the plants. Use your complete vegetable mixture, about a half cupful per plant, or some sulphate of ammonia — one-quarter cupful per plant.

(4) Tag the more productive bushes and give them special attention.

Do not try to transplant a good-sized blueberry plant from the woods to your garden. Try a small plant, if you wish. The flavor of wild blueberries is far superior to that of the cultivated varieties.

CHAPTER

VIII

CONTROL OF INSECTS AND DISEASES

A Little Opposition

You are going to have some opposition in the growing of your vegetables. I am often asked if it is true that garden pests are becoming more troublesome each year. Many people claim to remember the time when their parents or older gardening friends gardened with little thought or attention given to pest control. With the tremendous increase in the production of cultivated crops providing more food for insects and diseases, it is to be expected that these pests will multiply. The great increase in travel and exchange of goods has also had a direct relation to the spread and increase of many pests. In spite of rigid quarantines, diseases and insects have spread with alarming rapidity, and even with our more effective materials, improved machines to apply them, and pest-resistant varieties, we are hardly able to keep up with this opposition. The commercial grower who understands the pests, knows just when to spray, what materials to use, and has the proper equipment to apply them stands an even chance of getting the best of them. The amateur gardener, with his limited knowledge and equipment, is at a great disadvantage.

In order to garden successfully, you are going to find it necessary to have a good duster or sprayer and a small medicine chest of materials. Then, in order to use these effectively, you must know something about the more common pests. The control of most vegetable pests is difficult, but their prevention, fortunately, is comparatively easy. By this I mean that once an insect or disease is well established, its complete control takes heroic measures and is accomplished only after considerable damage has been done. Thus, it is important to know what pests may be expected and about when they will arrive. This indicates the value of keeping a multi-year diary. By recording the date certain pests appear one season, you can be on the lookout and get in that 'ounce of prevention' the

following year. As a rule, the time of appearance of most of the common pests varies but a few days from season to season.

It always surprises an amateur gardener when he first notices the presence of an insect or disease in his garden. The trouble seems to have come suddenly out of the air or up from the soil and settled on his plants. Even experienced gardeners are caught napping at times and become aware of a severe infestation of some pest when it is too late to do anything but protect uninfested plants. 'Be prepared' should be your watchword.

In my own garden, I make two applications of the Paris green-bran mash for the cutworms about May 1 and 20. Then I have found it best to make frequent light applications — twice a week up to July 15 and once a week thereafter — of rotenone dust on all crops I suspect of harboring or being about to harbor insects. The only disease I attempt to control is the potato blight, and for this I apply a copper-rotenone dust at ten-day intervals from the time the sprouts appear above the ground until the leaves die.

My medicine chest on April 1:

1 pound of Paris green, 20 pounds of bran, 2 quarts of molasses;
10 pounds of rotenone dust;
5 pounds of copper-rotenone dust;
1 good two-quart duster.

These simple directions are easy to follow, although I cannot guarantee that you will get along without any very serious trouble.

Some Pests and Diseases of the Common Vegetables

ASPARAGUS

Beetles. 1. *Common Asparagus Beetle* has black-and-white-checked wings; it is one-fourth inch long. It eats spears and leaves, lays small black stick-like eggs fastened by one end on new shoots. Dark gray-green grubs eat the leaves.

2. *Twelve-Spotted Asparagus Beetle* is orange with six black spots on each wing; it is one-fourth inch long. It eats spears and leaves and lays eggs inside of seeds in which the grubs later feed.

Control of both is by use of rotenone while cutting spears. Allow the smaller spears to feather out as traps, then cover these with lead arsenate. After cutting season and on young beds, spray or dust thoroughly with lead arsenate.

BEAN

Bean Weevil. Brownish-gray beetles one-eighth inch long and white wrinkled grubs feed inside of dry beans. They appear in the pantry or seed closet during the winter. Eggs are laid in the bean pods in the garden.

Control is by treating, soon after harvest, all dried beans you plan to save, either for seed or for baking. (1) Heat in oven for two hours at 130° to 140° F. (2) Place the beans in tight two-quart jar. Pour on cloth or blotting paper on top of beans in jar one teaspoonful of carbon disulphide, close jar tight, and leave in jar for twenty-four hours at a temperature over 65° F.

Mexican Bean Beetle is a dirty yellow round beetle about one-fourth inch in diameter with eight small black spots on each wing. It does a little eating of the leaf and lays its orange eggs on the under side of the leaves. The peculiar yellow grubs covered with odd fuzzy dark spines do most of the damage and soon skeletonize the leaves and the pods.

Control is easy if you get there while the insects are small. Spray or dust with rotenone when beetles first appear — about June 15 and August 5 — and twice a week thereafter for three weeks. Apply particularly to under side of the leaves. Lead arsenate is liable to burn the bean foliage seriously.

Diseases

Anthracnose is identified by sunken reddish-brown spots on pods, rusty spots or streaks on veins on under side of leaves, and sunken, rusty spots on stems.

Bacterial Blight causes water-soaked areas on leaves and pods. Also yellow spots or brown patches with yellow borders later becoming dead and dry.

Mosaic results in stunted plants with crinkled leaves, becoming mottled with light and dark green areas.

There is no satisfactory control for these; buy seed from a reliable dealer.

Rust is particularly common on pole beans. Small rust-colored spots appear on leaves and pods. There is no satisfactory control; plant resistant strains, use new poles and clean up diseased plants.

BEETS

Scab appears on the roots as raised, rough, corky-brown areas. Same as potato scab.

Control: Do not follow potatoes if they showed scab or vice versa. Avoid use of too much lime, wood ashes, or fresh manure once disease becomes established.

Stunted yellowish or bright red tops are usually a sign of too much or too little lime. Beets are the best soil-reaction indicators of the vegetable garden. If you can grow good beets, you can be reasonably certain the acidity of your soil is about right.

Control: Test soil. Reaction should be between pH 6.0 and 6.5. If it is below 6.0, add lime — two and a half pounds per hundred square feet. If it is above 6.5, add manganese sulphate — one-half pound per hundred square feet — with the watering-pot.

THE CABBAGE FAMILY — BROCCOLI, CABBAGE, CAULIFLOWER, TURNIP, RADISH, KOHLRABI, RUTABAGA

As members of the same family, these crops are each subject to the same pests.

Green Worms Eating the Foliage

1. *Imported Cabbage Butterfly* is a white or yellow butterfly often noticed fluttering around the garden. The larvae are soft, velvety-green worms about an inch long and are voracious eaters.

2. *Cabbage Loopers* are smooth, pale green, looping or measuring caterpillars about an inch long, legs only at ends. They come from grayish-brown moths.

3. *Diamond-Back Moths* are small, inconspicuous gray moths. The larvae are small, light green worms that work on the under side of the leaf, seldom cutting through to the top. Injured areas soon turn brown and drop out, leaving the leaf riddled with small holes.

4. *Zebra Caterpillar* is a yellow-and-black-striped, smooth caterpillar about two inches long, usually found in groups.

Control of all these is by frequent applications of rotenone or pyrethrum dust or spray.

Cabbage Maggot is a white, legless worm about one-fourth inch long, feeding on and in the roots. A small fly lays its minute white eggs on the soil or the plant at the surface of the ground. Affected plants wilt or become stunted. It also makes tunnels in radishes.

The cabbage maggot is another of those insects that may now be expected every year. If you set out any early plants or plant early seed of cabbage, cauliflower, or broccoli, you will need to protect them. No satisfactory substitute for the corrosive-sublimate treatment has been found. A 1 to 1250 solution is poured around the plants or along the seedling row just after the eggs are laid — about May 10 and 17. Corrosive sublimate may be purchased in tablet form for the small garden and by the pound in powder form for the large garden. The 1 to 1250 solution is made by adding one tablet to one and one-eighth pints of water or one ounce of the powder to ten gallons of water. Metal containers must be thoroughly rinsed after using, for this poison is really 'corrosive.' About a half cupful of the solution is used around each plant or for each half foot of row of seedlings. Use care, as the solution is also poisonous.

Club Root or *Root Knot* is a common disease found only on members of the cabbage family. Large, irregular swellings on the roots cause the plants to wilt on bright days.

Control: Beware of purchasing or using infected plants. Stop growing all members of the cabbage family for four or five years if the disease becomes serious.

Diseases of the Leaves and Stems

1. *Alternaria Leaf Spot* shows as spots on lower, older leaves, marked by concentric circles of a black, sooty color.

2. *Black Leg* causes cankers on the stem just above the ground, making the plants wilt and die.

3. *Black Rot* shows as a blackish discoloration of the veins of the leaves. Leaves turn yellow and drop off, leaving a long, bare stalk, usually followed by soft foul-smelling rot.

Control is impossible. Carefully pull up and dispose of affected plants. If serious, stop growing any of the cabbage family for four years.

Brown Heart:

of turnip: Water-soaked areas occur inside the turnip. The trouble is not apparent until the turnip is cut. Areas become brownish or grayish mottled.

of cauliflower: Water-soaked areas suddenly appear on surface of curd. Spreads fast, softens, and rots.

Control: Avoid excessive liming. Keep the pH below 6.8. Apply borax — about one-half pound per thousand square feet.

CARROTS

Rust Fly is a slender, legless maggot boring into root and making tunnels just under the skin. *Control* is impractical.

Leaf Blight is a yellowing and browning of the leaves. Control is impractical.

CELERY

Swallowtail Butterfly lays eggs on foliage of celery, carrots, and parsnips. They hatch out into greenish-yellow caterpillars with transverse black bands. *Control* usually consists of hand-picking. Rotenone or lead arsenate can be used in dust or spray.

Blights. The *early blight* forms large, brown irregular areas on the leaves. The *late blight* causes similar brown areas, but they are smaller and covered with black dots. Either may cause the leaves to wither and stunt the growth.

Control: Use Bordeaux 4–4–50 a neutral copper or 20–80 copper-lime dust at ten-day intervals from the time the plants are set.

CORN

European Corn Borer is now widespread. It is a dirty-white caterpillar with brown head and is a little less than an inch long when fully grown. It attacks many plants, particularly dahlias and sweet corn. Night-flying moths lay eggs on the under side of the leaves. Little worms usually head for the growing point or leaf joint. Tunneled tassels breaking over is usually the first sign of infestation.

Control: Apply rotenone dust to central whorl of leaves when borers are hatching (get information from your state college as to the exact time), and repeat every five days for three weeks. Clean up thoroughly all plant refuse that might be infested.

Corn Ear Worm. Moths lay eggs on the corn silk soon after it appears. Little worms work down the silk into the ear. Worms are larger than corn borers, also colored green or brown.

Control: Several drops of mineral oil in tip of ear just as silk begins to wither will smother worms as they attempt to crawl into the ear.

THE VINE CROPS — CUCUMBER, MELON, PUMPKIN, SQUASH, GOURD

Striped Cucumber Beetle is about one-fourth inch long with yellow and black stripes on the wings. They feed on the leaves, stems, and blossoms, appearing suddenly in large numbers.

Control: Frequent dusting or spraying with (1) rotenone, (2) Bordeaux (half strength)-arsenate mixture, (3) neutral copper-arsenate, or (4) copper-rotenone. Make applications on warm, sunny mornings after cool, wet weather. Protect plants with cheesecloth or mosquito-netting screens.

Squash or *Stink Bug* is a large, flattish, brown bug about five-eighths inch long which lays clusters of shiny brown eggs on the under side of the leaves. Spider-like gray nymphs hatch out which grow fast, meanwhile sucking the juice from the leaves.

Control: Frequent dusting or spraying with rotenone or pyrethrum, aiming particularly at the groups of newly hatched nymphs. Old bugs are too tough to kill with an insecticide. Pick off and kill all you can catch.

Squash Vine Borer is a white fleshy grub found in the stem near the root, causing the vine to wilt.

Control can be had by frequent dusting with rotenone dust from June 25 to July 25. Make a longitudinal slit in the stem to cut out the worm. Cover vines with soil at the base of the leaves as soon as the plant begins to spread out. If roots can be produced quickly, the vine will become independent of its main root.

Diseases

1. *Anthracnose* causes small, circular, brown spots on the leaves, elongated brown cankers on the stems, and sunken circular spots with pink centers on the fruits.

2. *Powdery Mildew* covers the leaves with a white mold.

3. *Scab* produces small, sunken cavities on the fruits with a drop of a clear gummy substance.

4. *Late Blight* or *Downy Mildew*. Yellow, angular areas on upper surface and purplish mold on lower surface of leaves, ultimately blighting the leaves.

Control of all is extremely difficult. Spray frequently with half-strength (2–2–50) Bordeaux or neutral copper, or dust with the copper-lime dust. There are a number of special cucurbit dusts now on the market which contain a neutral copper in combination with other materials.

Wilt is caused by bacteria that plug up the water-conducting systems of the stems. The runners wilt and die and eventually the whole plant dies.

Control consists in keeping the striped cucumber beetle off the plants, as the bacteria are spread by this insect. Remove a plant at first sign of wilting and dispose of it so the beetles cannot feed on it.

LETTUCE

Slugs are brown, slimy, snail-like insects with black spots and two fleshy 'horns.' They eat holes in the leaves and leave a shiny trail.

Control with Paris green-bran bait.

Drop, *Bottom Rot*, *Downy Mildew*, and *Gray Mold Rot* of lettuce are usually caused by damp conditions.

Control is impossible. Do not encourage too rapid growth by over-feeding or over-watering. Carefully remove and dispose of affected plants.

Yellows. Plants are stunted; leaves turn yellow. Same as aster yellows.

Control: Dust with rotenone dust to control leaf hoppers. Eradicate near-by weeds and annual asters that might carry the disease. Remove affected plants.

ONION

Onion Maggot is a white, legless maggot that bores in the onion bulb.

Control methods are impractical in the home garden.

Onion Thrips are tiny, slender, yellowish insects which feed on the leaves, causing a white or silvery appearance. Protected by the leaf sheath, they are difficult to control. Make frequent applications of rotenone.

Diseases

Onion Smut. This common disease of onions forms dusty, black spots or streaks on the onion seedlings, causing the leaves to twist and curl. Once it is established in a garden soil, you should not attempt to grow any member of the onion family for three or four years.

Control: One pint of formaldehyde to six gallons of water sprinkled over the seed after planting, before it is covered with soil.

PEAS

Diseases

1. *Blight* causes black or purple areas on stem and brownish-purple spots on leaves which soon shrivel and die.

2. *Wilt*, as the name implies, is a wilting and drying of the leaves starting at the bottom. The roots remain apparently undamaged.

3. *Root Rot* gradually kills roots, causing plant to turn yellow and die.

Control of these is impossible. Prevent by treating seed with semesan and planting on part of garden where peas have not been planted for four years. The best way to insure a good crop of peas is to plant treated seed on new land. I extend my garden ten feet every three years, and grow my peas in this new area.

POTATO

1. *Colorado Beetle* or *Common Potato Bug* is an oval-shaped beetle about three-eighths inch long with black stripes over a yellow color. It lays clusters of orange-colored eggs on the under side of the leaves. Odd red and black larvae soon hatch and start in to devour the leaves in earnest.

2. *Flea Beetle* is a small, hard, round, shiny black, jumping beetle about one-sixteenth inch long. It makes small round holes in the leaves.

3. *Leaf Hopper* is a small, elongated, pale-green insect about one-eighth inch long which hops or flies actively from plant to plant. It feeds on the lower side of the leaves, sucking the juice and causing the tips and edges to die and turn brown (known as 'hopper-burn').

Diseases

Late Blight is a most serious and common fungous disease. Affected areas on the leaves are water-soaked in appearance and usually show a whitish mold around the margin of the affected area on the under surface. The diseased leaves turn black and shrivel. In wet seasons the blight spreads rapidly, soon killing the vines — sometimes before the tubers are half grown. The disease organism often attacks the potato tubers, making it impossible to store them for any length of time.

Control: It does not pay to take a chance on potatoes. If you are going to grow them (if you have room I strongly recommend it), plan to spray or dust them regularly. Get your materials ready when you plant the seed potatoes and keep the foliage covered with a protective layer of copper all the time and with a layer of arsenic until bug time is over. Use a Bordeaux-arsenate spray, a neutral copper-arsenate or a copper-lime-arsenate dust through bug time (August 1). Then a straight Bordeaux or neutral copper spray or copper-lime dust until the foliage is

about gone. If you have just a small patch, the combined insecticide-fungicide can be used through the season, saving the purchase of a separate material.

Scab is a soil-borne fungous disease causing irregularly shaped, raised, rough, corky areas. It spoils the appearance of a potato, but unless it is severe it has little effect on the quality.

Control: It is mainly because of this disease that potato growers try to keep their soil acid — pH 5.2 to 5.4 — as the fungus does not thrive under this condition. In a small garden where various vegetables are growing, it is necessary to keep the soil reaction slightly above pH 6.0. If scab gets established and becomes serious throughout the garden, the only thing to do is to stop planting potatoes. Do not use scabby potatoes for seed. If you suspect the disease may be on the seed tubers, treat them with the special potato dip available at seed stores. Excessive use of lime or stable manure will encourage the disease, so do not use either of these materials on the section of the garden in which you plan immediately to plant potatoes.

Rhizoctonia causes small black spots on the skin of the potato that resemble bits of dried soil that will not wash off. They do little harm to the tuber, except in appearance, unless exceptionally severe, when infected seed pieces might not sprout after planting, causing many skipped hills.

Control: Treat the seed with a special potato dip obtainable at seed stores.

TOMATO

Horn Worm is an exceptionally large (up to three inches by one-half inch) green caterpillar that strips the foliage, leaving the main veins. When almost fully grown, this worm will trim several stalks of a tomato vine in a day. The most practical control in the small garden is to pick the worms off by hand. There is no practical preventive.

Corn Ear Worm is a large (one and a half by one-fourth inches) green or brown caterpillar which burrows into the fruit.

Control: Pick and destroy infested fruit. There is no practical preventive known.

Stalk Borer is a greenish-gray caterpillar with white stripes which bores into the stalks, causing them to wilt and die.

Control: Split stems with knife and kill the borer. There is no practical preventive.

Flea Beetle is a small, black, shiny, jumping beetle about one-sixteenth inch long that makes small round holes in the leaves, attacking the plants from the middle of May to the first of July and exposing the leaf to infection by the early blight fungus.

Control: Keep the foliage protected by a light coating of copper and/or arsenate or rotenone, covering both the upper and lower surfaces.

Diseases

1. *Leaf Spot* causes small, brown, circular spots speckled with minute black dots, withering the leaves and defoliating the plant.

2. *Early Blight* is a common fungous disease that usually is not serious, but checks growth considerably. Irregular brown spots with concentric rings on the leaves appear, also brown patches and rot associated with growth cracks in the fruit, usually about the stem end.

3. *Late Blight* and *Fruit Rot* are the same as the potato blight. When weather conditions are wrong, the disease may be serious. In 1933 ninety per cent of the tomato plants along the Atlantic seaboard were destroyed by the middle of September. Rough, sunken, brownish areas develop a soft-rot condition on the fruit. Diseased leaves turn black and shrivel.

4. *Buckeye Rot* is quite similar to the late blight in the appearance of the diseased fruit. The foliage, however, is not affected. A slight difference will be noticed in the presence of concentric rings on the diseased areas, as well as the fact that the diseased fruit remains firm for some time.

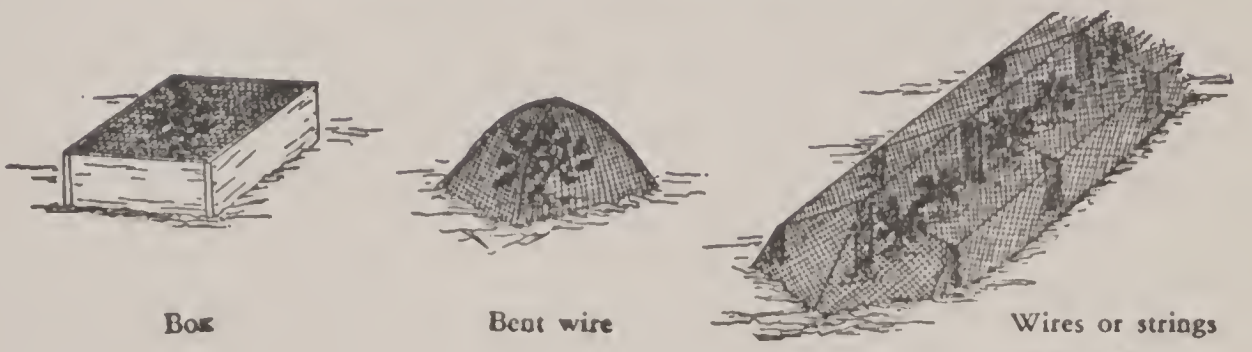
Control: First, control flea beetles. Then keep the leaves covered with copper, either copper-lime dust, half-strength Bordeaux (2–2–50), or preferably one of the new neutral coppers. Apply at weekly intervals from the time the plants are set in the field.

Wilt. Several organisms cause the wilting of tomato vines. There is no practical preventive. Pull up affected vines and destroy them.

Blossom End Rot is a common physiological disease causing circular brown areas around the spot where the flower has fallen off. It may appear on fruit of all ages and sizes.

Control: As this is not a contagious disease, fungicides will not have any effect on it. In fact, because Bordeaux is drying, it may increase the trouble. The rot is caused by a breakdown of the cells due to lack of an even supply of water. Avoid dry locations, apply water in dry periods, and use a mulch of grass, hay, strawy manure or peat.

Protect plants from pests with cheese cloth or screening wire



There are other pests that may give you some opposition. Wild animals can do a great deal of damage in a short time in your vegetable garden, unless it is fenced.

Rabbits can be shot, trapped, or poisoned. Animals are creatures of habit. If you can find out when and where they first start feeding, you can sometimes discourage them very easily. Spray the plants near-by where the damage has been done with nicotine sulphate every other day for a week. If that does not work, set a box trap.

Woodchucks can be shot, trapped, or gassed. If you can find their holes (all of them) and they are not in a stone wall, you can try the easiest way. Stop up all but one hole (or better treat all the holes), pour three to four tablespoonfuls of carbon disulphide on a cotton cloth, throw the cloth into the hole, and stop the hole tightly by filling in with damp soil. Carbon disulphide is a foul-smelling, very inflammable liquid, so beware. Or you can use calcium cyanide (cyanogas), a free-flowing, black powder which is a little easier and safer to handle. Place two tablespoonfuls well down in the hole or holes and fill in with damp soil. You can also asphyxiate the animals by using the exhaust gases of your automobile.

Rats and mice are miserable pests around hotbeds, coldframes, or the vegetable garden. They are not easy to control. Mice can sometimes be attracted to traps or special baits. For rats, try Red Squill mixed with meat, fish, cereals, fruits, or the vegetables they are eating in the garden. Directions for using this should be on the container. This material is poisonous only to rodents.

Moles will invade a vegetable garden and make life miserable until you get the better of them in one way or another. Their food consists

chiefly of worms and insects. Seldom do they touch vegetables, but their runways can heave up a lot of plants. They prefer to operate in moist soils. If your garden is on a sandy or gravelly subsoil, you may not have trouble. The following controls are frequently used with success:

Traps. Several kinds of traps are available, all depending upon the operation of some tripping device which is not too easy to set correctly. The trigger pin is designed to rest upon the runway, and is sprung when the mole follows its natural instinct to reopen the runway by burrowing through. A good strong garden trowel is the best tool to use in setting a trap.

Asphyxiating. Attach a garden hose to the end of the automobile exhaust pipe by wrapping with a piece of old inner tube or use electricians' tape. Insert the other end of the hose in the runway and allow the motor to run for fifteen minutes.

Calcium cyanide (cyanogas). Place a tablespoonful of this free-flowing black powder every five feet.

Carbon disulphide. This foul-smelling, inflammable liquid is handled in the same way as cyanogas.

Paradichlorobenzene or naphthalene. These are placed in the burrow as above, but serve more as repellents than as actual killers.

Household lye. Crystals deposited in burrows discourage moles very quickly.

All these materials may be placed in the burrow at five-foot intervals by the use of a small funnel without greatly disturbing the soil.

Poisoning by baits placed in runways. Whole corn soaked in a water solution of arsenic or powder Paris green over half-inch squares of raw meat.

For a further discussion of diseases and pests, see Appendix B.

CHAPTER

IX

GROWING EARLY VEGETABLE PLANTS

The 'Early Bird'

Few real gardeners garden very long before they feel the urge to grow some early plants. It satisfies that desire to do something when, after a long winter, the feel of spring is in the mind, even if it may not be in the air. The garden fever is usually started by the appearance of the new seed catalogues, and the growing of some early plants offers an outlet for that pre-garden energy.

Unfortunately, the majority of those who try to grow early plants are doomed to fail before they even start. The elements are against them, and only those who are equipped to do battle and are able to give the proper attention stand a chance of growing good plants.

Now, do not let me discourage you. The proper equipment need not be expensive (I know of a number of gardeners who distribute a miscellaneous collection of cans and boxes over the window sills on the south side of their home), nor need the attention be continuous. I know also several successful plant growers who are unable even to look at their plants during the daytime on weekdays.

Determine the conditions the seeds and seedlings require and, if you think you can provide those conditions, go to it!

Growing Plants Without Special Equipment

As it is practically impossible to set early plants directly from the seed flat into the garden, all early plants should be transplanted. When the seedlings are set over into individual pots or about 2 × 2 inches in a box, they take up considerable room. A small box of seedlings will fill several boxes with plants. It is therefore necessary to exercise self-control when planting the seed.

Soil. An ideal soil for growing plants is loose and friable, should hold moisture yet not be damp, and should not crust or cake. It does not

need to contain very much plant food, particularly for growing the seedlings. It should be slightly acid — pH 6 to 6.5 in reaction.

Mixtures that Can be Used. 1. If your garden soil is a good sandy loam, it may be possible to use it as is.

2. If your soil is heavy, mix one pail with one pail of rotted manure and one pail of medium-fine sand. Peat or compost can be substituted for the manure.

3. I often use a mixture of one pail of screened peat and one pail of sand. This, of course, is only good for starting the seeds. As this mixture contains no plant food and is acid, I add a tablespoon of complete fertilizer (5–8–7 or any similar mixture) and a tablespoon of lime to the two ten-quart pails. You will often find reference to the use of sand alone for starting seed to avoid trouble from damping off, but I find that it dries out altogether too quickly. The peat holds the moisture and also clings to the roots when the seedlings are transplanted.

4. If your soil is very light, mix one pail of soil with one pail of the rotted manure, peat, or compost.

Mixtures 2 and 4 should be made up as long as possible before using. Leave the soil outside where it will freeze, but in a wooden box so that it can easily be brought into the basement to thaw out.

Screen the soil and sterilize it if possible. The simplest methods are: (1) bake in the oven in shallow pans for two hours at 180° F., no hotter; or (2) pour boiling water over it — two quarts of water to each quart of soil. Other methods of sterilizing are given on pages 124–125.

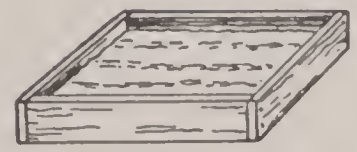
Container. Shallow wooden boxes, or flats, are best. But you can use anything that will hold the necessary soil. The container should be at least three inches deep and easy to move.

The Seeds. If the soil is not sterilized, it will help greatly if you treat the seeds just before you plant them. The treatment is very simple: Pour a little of the disinfecting powder into a small tin, bottle, or envelope; put the seed in and shake until every seed is coated. The excess powder can be used again. (See table on page 126 for the proper materials to use.)

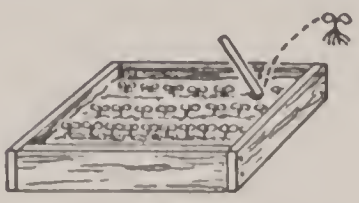
Even if the soil is sterilized, it may pay to treat the seeds.

Planting. Plant only a few inches of row to each kind of seed. This should provide quite a number of seedlings. Plant seeds that have approximately the same period of germination in the same box. (See table on page 128.)

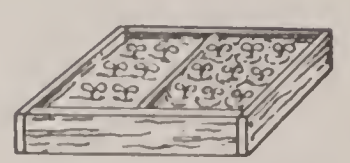
Start seeds in the home for early plants to set in the garden



1. Plant seeds in rows—just cover seeds.



2. Transplant seedlings before they crowd. Pry out, don't pull.



3. Set seedlings 2 inches apart in box or in pots.

Sow the seeds in rows about two inches apart — just deep enough so that the seeds will be covered and just thick enough so that the seeds will not touch each other. I like to make the furrows with the back of my finger; this makes a broad furrow — one that is easily adjusted to suit conditions. Cover the seed with soil, press firmly, and water. If the soil mixture tends to crust, it may be best to use sand for covering the seed or even the whole surface of the flat. The smaller the seed, the more care it takes to get good results. Very fine seeds, such as those of petunia and snapdragon, should be scattered over the surface of the flat and pressed in firmly.

Moisture. When watering, a very fine spray must be used to prevent washing the seed out. If you prefer, you can place the flat in a shallow pan of water and leave it there until the water is soaked up to the surface. Personally, I prefer to cut a piece of burlap or cloth to fit the container. This prevents washing, keeps the seeds moist all the time, but must be removed as soon as the seeds start to sprout.

If the soil in the flat is too wet, disease is likely to attack the seed or seedlings. Many times a gardener has blamed the seedsman for selling poor seed when the fault was his. Several organisms commonly found in soil attack the seed itself or the tender shoots before or just after they appear above the soil surface. The great majority of seeds sold today have an unusually high germination. If you are unable to get a good percentage of plants, the chances are it is poor soil conditions or careless watering.

If the soil in the flat gets too dry, the seed may not have vigor enough to germinate. A paper or glass over the container may help to keep the surface moist — by no means make a tight cover or the air will become humid and encourage disease. Covers must be removed when the seeds sprout.

Light. As soon as the seedlings break through the ground, full light is necessary, and, if possible, it should come from at least two sides. The plants will grow toward the source of light. If the temperature is a little too high, it is surprising how quickly the seedlings will stretch and stretch until they get so spindly they become useless. You can help by getting the flat close to the window, lowering the temperature, or providing a little artificial light on the other side. Frequent turning of the containers will keep the seedlings straight.

The longer you put off the planting of your seed, the higher the sun will get and the more light there will be, so don't be in too much of a hurry to get the seed planted.

Temperature. For even and quick germination, keep the seed containers at a constant warm temperature — between 70° and 90° F. As this temperature is also ideal for the growth of diseases, the moisture conditions must be carefully watched. To keep a balance between the temperature, moisture, and ventilation of the surface of a seed flat is not easy. Even the most experienced growers lose some valuable seeds occasionally. Sterilization of the soil and disinfection of the seed will help.

As soon as the seedlings are well established, the temperature can be lowered (60° to 65° F.), particularly if the light is none too good.

Transplant as soon as the seedlings are large enough to handle. Keep the plants warm for a few days to get them established, then place them in the temperature required for the type of plant. (See the chart on page 128 for temperatures.)

I realize that it is going to be impossible for you to maintain these ideal conditions. You must do your best to have the containers in the part of the house where the conditions are nearest the ideal. This may mean moving the containers every morning and night. The cool-temperature plants can be kept in the unheated bedroom window during the day. At night it may be necessary to put them out in the hall or in the unheated sun parlor. The tomatoes and flower plants can be kept in the warm sun parlor during the day and moved into a heated room at night.

Hardy plants prefer growing temperatures of 50° to 55° F. Tender plants prefer 60° to 65° F. — no higher.

Thinning. If the seeds germinate well, the seedlings may be so thick as to cause crowding. Spindly plants will develop if these seedlings are not thinned or transplanted soon.

Transplanting. As soon as the seedlings are large enough to handle, they can be transplanted. If the plants in the seed flat are not too crowded and growing conditions are such that they will not get spindly, you can leave them there for some time if necessary.

The purpose of transplanting is to provide each plant with room to develop a good root and top — then, when they are set in the garden, they will have a better chance to live. I believe that 2×2 inches is the closest you can set the plants in boxes and expect to get a decent plant. Some plants, such as tomatoes, will have to be moved again to 3×3 or even 4×4 inches to produce good stocky plants. As long as plants are too close, they will have a tendency to grow tall and spindly. If your plants do this, you will know that they have been too crowded or too hot.

In spite of the fact that hundreds of different kinds of containers have been offered for sale during the past thirty years, clay pots are still the most satisfactory, even for the back-yard gardener. Of course, you can use your old tin cans and boxes if you like. They will serve the purpose satisfactorily. If the plants are not in separate containers, take a knife and cut halfway between them about a week before they are to be set out. This cuts the long roots and stimulates new roots to grow near the plant. Then, when the plant is moved, the fibrous-root system holds the soil together, if it is handled carefully. Water the plants a few hours before they are transplanted. The soil will stick together and cling to the roots better, and the plant will be in better condition.

Some plants are difficult to move except when very small. The vine crops — cucumbers, melons, squash — and beans, corn, peas, and so on, must be grown in individual containers. You can start the seeds in flats and then transplant to the pots, or sow the seed directly in the pot.

To harden or acclimate the plants, it is advisable to set them outdoors in a somewhat protected place for a day or two. Then, when they are set in the garden, the hot sun and drying wind will not injure them. The shock of moving directly from the protection of a room to an exposed place in the garden is often so great that a plant never completely recovers.

Growing Plants with Special Equipment

The right kind of equipment is a valuable aid in the production of good plants. Take your choice.

Plant-growing structures fall more or less definitely into three general

types — coldframes, hotbeds, and plant houses. Any of these should be conveniently located, as they require a great deal of attention. They should be near a supply of water, in a well-drained spot, and should receive a maximum of sunlight and protection from cold winds.

A *coldframe* consists of a frame of boards or planks with a glass sash cover. The back of the frame is raised to give the proper slope to the sash to allow the water to run off and let in the most sunlight: usually a slope of about one inch to each foot. The frame and sash can be of any desired size. The standard coldframe and hotbed sash measure 3×6 feet. They are very heavy and bulky for one person to handle. For my personal use, I have made a frame four feet from top to bottom and six feet wide, covered with three sashes two feet wide and four feet long. The coldframe can be set directly on the ground or placed in a shallow pit. Some soil, straw, or other material banked up around the sides will help to keep it warm. A cover — old carpet or burlap bags — is needed for protection on particularly cold nights.

The coldframe is usually used as a place to transplant seedlings that have been started in the home or hotbed. Hardy plants, such as lettuce and cabbage, can be set in the frame early, as a light freezing will not injure them. Tender plants cannot be set in until freezing weather is over. Seeds planted in the coldframe will not grow well until after the weather has pretty well settled.

Hotbeds are coldframes provided with some sort of artificial heat. In order to conserve the heat, the frame should be more substantial, more carefully made, and better protected. Fermenting manure has for many years been the main source of heat for hotbeds. Electricity and hot water are more satisfactory. The electric hotbed is extremely practical. I have used one for more than ten years, with very satisfactory results.

The cost of equipment is low — a sixty-foot lead-covered cable which will heat from ten to fifty square feet costs less than five dollars, and a practical thermostat to maintain any desired temperature costs less than ten dollars. At three cents per kilowatt hour the cost of heating a standard 6×6 foot two-sash bed is less than three dollars a month with outside temperatures running to 15° F. and inside temperature maintained at 60° F. The cable can be laid below ground or on the surface. Hot water or steam can be used for heat by installing a pipe or two around the inside of the frame — hot water is to be preferred, as steam is drying and will burn plant tissues. It may be possible to connect with the house heater or install a separate small heater in the house basement.

Hotbeds make an ideal place to start seed and grow plants for setting in the garden. With an additional coldframe it may be possible to utilize the hotbed to start two or even three sets of seeds. The hotbed can also be used to grow a few early crops — lettuce, radish, beets, and others to maturity.

Plant houses may be inexpensive frame structures covered with hotbed sash or regular small greenhouses. They make an ideal place to start seed and grow plants — the heat, moisture, and ventilation can be easily controlled. Seeding and transplanting operations can be performed whenever desired, regardless of weather conditions. The plant houses can be used to mature a crop after the plants are out as well as during the fall and winter.

Those of you who are interested in making a plant-forcing structure will need further information, and may write to your state college for sources of detailed information. Glass is the best material for covering forcing structures, large or small. Glass substitutes and treated cloth have not proved very satisfactory. I have used most of them, and have yet to find one that I would recommend.

CULTURAL DIRECTIONS

Practically all that I have written about the production of early plants in the home also applies to the growing of the plants on a larger scale. The only essential that I feel needs to be enlarged upon is the matter of soil and seed sterilization.

Disease-free soil is a great aid in the growing of good vegetable and flower plants. All diseases are not apparent when the plants are ready to set out in the garden; many are spread to the garden by infected soil or seed. Damping-off is probably the most serious disease encountered in the growing of plants, while root rots and wilts may not be noticed until the plants begin to bear their crop in the garden. A number of treatments are advocated to sterilize the soil.

Sterilizing by Heat. The temperature of the soil must be raised to 170° F. for twenty minutes to expect results. This temperature will kill most of the harmful organisms. It is true that many of the beneficial organisms will also be killed, but this cannot be helped, and from numberless experiments it does not seem to have harmful effects. If you are ever in doubt as to whether or not the proper temperature has been reached, place a small potato in the center of the soil; when it is baked your soil

is well sterilized. The soil should be moist for best results from these methods.

1. Steam is an effective means of disinfecting the soil. Its application is usually too complicated for the amateur.

2. Hot water is a common method that I have already advocated. It takes a great deal of very hot water to be effective — at least twice as much water as there is soil.

3. Baking is another method I have mentioned. Care must be taken not to burn the soil by getting it too hot. If done in the kitchen oven, the odor is none too agreeable to some members of the household.

4. Electric soil sterilizers are now available; they are not only very satisfactory, but economical. I have used one for several years which completely sterilizes six cubic feet of soil with six kilowatt hours of electricity — at three cents per kilowatt hour, our present rate, the cost is about three cents per cubic foot of soil. The weed seeds will also be killed.

Sterilizing by Chemicals. 1. *Acetic acid*, although quite satisfactory, has not been extensively used.

2. *Chloropicrin*, a tear gas, is a product of the First World War. It has been successfully used for years in Japan for sterilizing the soil. A number of growers are already using it in this country, some to kill weed seeds in their compost pile, others to kill insects and diseases in their soil. It is being used in the greenhouse, hotbed, and outside in the garden. Special applicators are available, as the gas is very unpleasant to work with.

3. *Formaldehyde.* Liquid treatment consists of drenching the soil, benches, pots, and flats with a one to seventy-five solution of formaldehyde (one gallon of formaldehyde to seventy-five gallons of water). Formaldehyde dust is mixed with the soil at the rate of one-half pound of dust to each bushel of soil. The treated soil is then used immediately in flats or beds for planting the seed as usual, but with the use of an extra large quantity of water after covering the seed.

Formaldehyde is also unpleasant to use. Considerable care must be taken in its use, as a little of the fumes will kill growing plants. Be sure you understand just how to use it before you try it with any valuable seed.

In the use of any kind of sterilizing agent, be assured that any material that is going to be effective is dangerous to handle. Be suspicious of all materials that advertise the safety factor. The chances are that their value as a killing agent of disease germs is extremely low. Get detailed directions for the use of these chemicals from your state college.

Treating Seed for Disease Control. During the past few years a number of chemical powders have been found of great value for treating seed to insure better germination. These chemicals to a certain extent sterilize the soil around the seed. In this way the seed itself is made immune to attack by soil organisms, and the sprout gets a good healthy start. This treatment is of particular value when starting seeds early in the home, hotbed, or greenhouse. It is also being used successfully to insure an even stand when planting seeds in the garden in a heavy soil or in wet weather. Some seedsmen now treat all their vegetable seeds with the recommended materials. Florists and commercial vegetable growers are finding the treatment of seed a practical and money-saving operation.

The amount of powder to use for best results will be found with the directions accompanying the package. The usual procedure is to place a small quantity of the powder with the seed in a can, bottle, or envelope. Shake well until every seed is coated with the material. Then place in a sieve and the surplus powder can be used again. The seed can be immediately planted or kept for a few weeks. Treated seed may not keep too well over a period of several months.

A satisfactory schedule of treatments has been worked out for vegetable seeds. Work has started on a similar schedule for the treatment of flower seeds. Various seeds react differently to the various chemical powders, and it takes several years to determine the best treatment for each kind of seed.

Red Copper Oxide	*Semesan*	*Zinc Oxide*
Beet	Broccoli	Bean (Lima)
Carrot	Cabbage	Cabbage
Chard	Cauliflower	Carrot
Cucumber	Corn	Cauliflower
Eggplant	Onion	Celery
Lettuce	Pea	Parsnip
Muskmelon		Radish
Pepper	(Recommended at the present time for use with all flower seeds.)	Turnip
Spinach		
Squash		
Tomato		

Plant Protectors and Forcing Boxes. It is possible to mature vegetables a few days earlier by the use of a protecting cover of some sort. The old-time gardener was using a forerunner of this type of equipment when he covered his rhubarb plant with a half-barrel. Many different kinds of

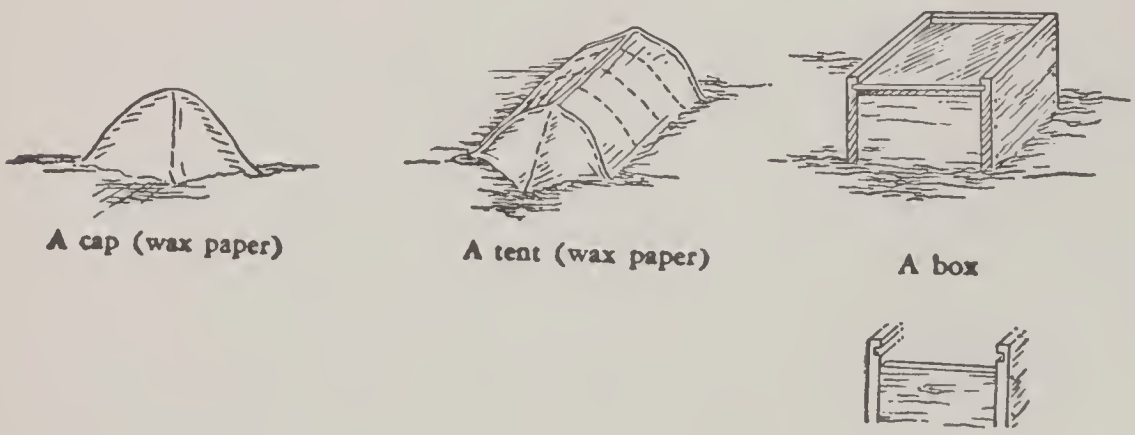
plant protectors have been used successfully by vegetable growers. On a large scale, regular hotbeds or coldframes are used in the fields with standard 3 × 6 foot glass sash in the North and muslin covers in the South. In France and Belgium, the so-called 'bell jar,' a heavy glass cylinder with rounded top, is extensively used.

The purpose of these protectors is to maintain a higher temperature inside and thus force the plant to grow faster. They are left on until the weather settles or the plant grows too large. There must be a chance for ventilation on warm bright days or the air inside the protector will become so hot and humid that the plants become soft and sickly. Then, when the cover is removed, exposing the plants to the bright sun and drying winds, they are slow to recover. Protectors made for use over a period of years usually have an adjustable cover; inexpensive paper covers are slit open with a knife as soon as the plants inside begin to grow.

Wire frames are available to hold two sheets of glass, tent-like, over the row. Placed end to end, these can be made any desired length. Other frames of various shapes covered with one of the glass substitutes are also available. A common forcing-box is a four-sided frame made of heavy waterproofed cardboard or wood, open top and bottom. These can be made any desired size. The top is provided with a wire or slot to hold an adjustable glass cover. Inexpensive waxed-paper covers are also available in many shapes. Small dome-shaped, reinforced covers are called 'Hot Caps'; larger tent-like covers are called 'Hot Tents.'

I suggest that you try some kind of plant forcer in your garden. See how much earlier you can get your tomatoes, summer squash, or cucum-

For early crops try a plant protector



A cap (wax paper) **A tent (wax paper)** **A box**

Detail showing slots to take double-thick glass cover.

bers by using a cover. There are two important points to consider when using any kind of protector: (1) Be sure that the ground is well supplied with moisture before covering the seeds or plants, and (2) provide for ventilation as soon as the plants start to grow.

Some Suggestions for Early Crops

Although the average gardener is supposed to be blessed with an extra amount of patience, we all enjoy getting quick results from any work we do. Perennial vegetables provide us with that much-desired spring tonic. Both rhubarb and asparagus are often ready even before the weather has settled down and we are able to plant the seeds of some of the less hardy annual vegetables.

Seed of the following vegetables can be planted in the garden as soon as it is ready and will mature a crop within eight to ten weeks:

Lettuce Peas Radish Spinach Early Turnip

If plants of the following vegetables are set in the garden as soon as danger from hard frost is over, they should mature their crops early in the season:

Beet Broccoli Cabbage Cauliflower Lettuce Onion

Table for Starting Early Vegetable Plants

Vegetable	Minimum Constant Temperature for Starting Seed	Minimum Night Temperature* for Growing Plants	Approximate Days from Planting Seed to			Hardy, Half-Hardy, Tender
			Germination	Transplanting	Setting Out	
Beet	60° F.	50° F.	6	not transplanted	55	h
Broccoli	60	50	4	20	55	hh
Cabbage	60	50	4	20	50	h
Cauliflower	60	50	4	20	55	hh
Celery	70	60	12	45	80	hh
Cucumber and melon	70	60	4	14	30	t
Eggplant	75	65	9	40	90	t
Lettuce	60	50	4	25	50	h
Onion	60	50	6	not transplanted	55	hh
Parsley	70	60	14	50	80	hh
Pepper	70	60	6	35	75	t
Squash and pumpkin	70	60	4	14	30	t
Tomato	70	60	6	25	75	t

* Temperatures: Day temperatures should not be more than twenty degrees higher than night temperatures.

CHAPTER

X

STORING VEGETABLES

Stretching the Season

Since 1920 a great change for the better has been taking place in the quantity and quality of fresh vegetables available throughout the fall, winter, and spring at every corner grocery. Instead of a 'cold closet' for keeping home-canned produce, fruits, and root vegetables, the modern house has its oil heater and playroom. These two factors have combined to discourage home storage of fruits and vegetables.

In our great country there is at least one section where practically every vegetable crop can be raised every month of the year. With refrigerated freight trains and trucks traveling at express speed, these products are delivered throughout the country in a comparatively short time at a remarkably low cost. Even so, the back-yard gardener can store and can his surplus vegetables to advantage.

The problem of keeping vegetables in good condition for some time after they are harvested is not an easy one to solve. Personally, I believe it is much more practical for the average gardener to can his vegetables than to attempt to keep them throughout the winter in a pit or cellar.

Storage Problems

Selecting Produce to Store. A vegetable is certainly not going to improve in storage. Years ago, when it was a common practice to stock up with vegetables in the fall, it was difficult to get anything fit to store except potatoes, onions, and turnips. It was thought beets and carrots became woody when stored, but the trouble was that they were already old and woody when they were put into storage. It was considered important to store only the mature vegetables. Now we know how necessary it is to select vegetables that are still growing, for this growth process continues in storage, though at a very slow rate. If you plan to store some of your garden products, be sure to follow my recommendations for late plantings

of beets and carrots. Squash also keeps best if the shell is not too hard. Even cabbage and celery will be better if not fully matured. Potatoes and onions should be well ripened and fairly dry. Do not attempt to keep bruised vegetables, or you will be increasing the danger of disease.

Temperature. Most of the vegetables must be kept at a low temperature — 35° to 40° F. — to keep them as near dormant as possible. All vegetables must be kept from freezing. I well realize the difficulty of maintaining the proper temperature in a cellar or pit with the outside temperature fluctuating from above 60° F. to below zero. You must do the best you can, however, to provide protection from both extremes. This may require frequent attention in opening and closing ventilators. For example, it will help if you can cool off the room by opening a window in the evening. A small fan would be of great value in making it possible to ventilate thoroughly the storage room on a cool night during a warm spell or on a warm day during a cold spell. Contrary to some recommendations, even squash, onions, and potatoes should be kept cold even though they will keep fairly well at higher temperatures. Do not take a chance on the cold not getting in; either have a source of heat available or sufficient insulation. When the temperature gets down below 10° F. with the wind blowing in the cold, your produce will need good protection.

Ventilation and Humidity. Stagnant air is moist and encourages disease. A little ventilation will keep the moisture from collecting on the walls and dripping from the roof. On the other hand, most of the vegetables will dry out and shrivel if there is too much ventilation. Squash and onions should be stored where there will be a good circulation of air. They keep best in a fairly dry atmosphere. All the other vegetables prefer a fairly high humidity. An electric fan will help: (1) to circulate the air; (2) to dry up excessive moisture; and (3) to lower or raise the temperature, according to the need.

Place for Storing. The best place is a cold room in the house basement. It will usually be a corner partitioned off with some good insulating material and containing an outside opening for ventilation.

A permanent outdoor pit is a room dug into the ground, walled with stone or concrete, covered with an insulated roof, and provided with a bulkhead entrance with steps leading down. A steep bank can be used to advantage; otherwise the problem of drainage may be a difficult one. A chimney-like flue should be made in the roof at the opposite end from the door.

Small, annually renewed outside pits can be made in the garden, or the hotbed or coldframe used as a pit. The first requisite is a place that will be free from water. The pit can be made almost any depth and width, depending upon the drainage condition and the amount of produce you desire to keep. I suggest a pit about a foot deep and three feet wide. Make it as long as necessary. Throw out the soil, spread some straw or excelsior on the bottom, and pile the vegetables in a mound about two feet high in the middle. Cover with a foot of straw or excelsior and hold this down with an inch or two of soil. As soon as this layer of soil is frozen, throw on the remainder of the loam — at least six inches more. Then another foot of straw, hay, or just plain leaves. It takes a lot of cover to keep the vegetables from freezing. If the vegetables are mixed when piled, you can start taking them out at one end of the pit and work along as they are used. If desired, you can use a barrel placed on its side in the pit. This will make it easier and cleaner to get the vegetables out during the winter. Any number of barrels could be used.

Crops That Can Be Stored

Beets. Pull just before you expect a heavy freeze and cut the tops off. Do not allow the roots to dry off. Keep only those you would consider eatable at the time. I always pull the beets that are left over in my garden and pack them in moist loam in a box. This will keep in my garage (no heat) until after Christmas. For longer storage some other place would be necessary. The roots can be stored in boxes or bins; if the storage is dry, they should be packed in peat, loam, sand, or sawdust; if the storage is moist, merely covering with a burlap bag may be all that is necessary.

Cabbage. Pull the whole plant just before a heavy freeze. Set the roots in moist soil in a box or on the floor. Keep as cool as possible. If in a place where they might freeze, cover the heads with hay or straw. Set in a coldframe or pit with the roots in soil, cabbage will keep as long as it is protected from freezing. If the roots and outside leaves are cut off, the heads will keep for some time. The regular winter cabbages are thus kept on racks in special buildings. A low temperature, high humidity, and a little ventilation are the necessary conditions.

Carrots. Same as beets.

Cauliflower. Plants with a curd just about full grown will keep for a short time if protected from extremes of temperature. The whole plant can be hung up in a cold, moist room or planted in moist loam in a cool place

Celery. Pull the whole plant, remove the outside leaves and all other diseased leaves, and transplant to a storage place where there is protection from extremes of temperature. Set the plants close together with the roots in moist loam. It may be necessary to moisten the soil, but keep the water from the plants. Do not attempt to store the white varieties more then three or four weeks. If desired, celery can be stored in a narrow trench in the well-drained garden. Make the pit as deep as the celery is tall and from twelve to eighteen inches wide. Pack the plants in tightly with the roots in the soil. Cover the trench with two boards nailed together to form an A-shaped cover. Protect this with a foot of hay and several inches of loam.

Endive. Lift the plants with as much soil on the roots as possible. Transplant to coldframe or box, where they can be kept for a few weeks if protected from extremes of temperature and moisture.

Leek. Same as endive.

Onions. Pull and spread out in the sun until thoroughly dry and twist the tops off. They are then comparatively easy to keep, provided they are the right variety. Store in attic or other dry cool place where they will not freeze. Keep them in a ventilated container so that the air can circulate through them.

Parsnips. Same as beets. Leave some in the garden for spring use. Parsnips are at their best only when they remain in the ground all winter.

Peppers must be harvested before a frost. Pull the whole plant or pick the fruits. They will keep for several weeks if kept cool and fairly moist.

Potatoes must be carefully dug and handled. They should be allowed to dry off for a short time only. They can be kept in a box, bag, or bin. Keep them out of the light. Best conditions for keeping are cold and somewhat moist, but on the dry side rather than wet.

Winter Radish. Same as beets.

Rutabaga. Same as beets.

Squash and Pumpkin. These must be harvested before a frost, for if the shell is nipped, they will not keep. Handle them carefully and store in a fairly dry place. They are not particularly fussy as to temperature; I have had them keep equally well in both hot and cold storage. The important condition is good air circulation. There is no reason for keeping them in a pile outdoors to ripen or harden.

Tomatoes. Tomatoes must be picked before a frost, although if there is much foliage, it will usually protect the fruits from the first light frost.

A few plants can be protected by covering with bags or straw. Some gardeners pull the whole vine and hang it up until the fruit ripens. I have tried this, and am certain that the fruit keeps just as long when it is picked and stored in a ventilated box or basket. Pick all fruit that seems large enough to be worth keeping. Store in an open shed or dry, cool basement. Sort the tomatoes every three or four days and remove any that are well colored or show any signs of disease.

Turnips. Same as beets.

If rats or mice get into your stored vegetables, they will be exceedingly difficult to control. Traps or poisoned baits should help, but prevention is best, if possible.

Do not forget to pot up a plant or two of parsley and chives, excellent both for garnish and flavoring.

I have not mentioned the possibility of drying or freezing your vegetables. A good many years ago, much was said about drying vegetables. Because of the poor flavor and color, as well as the work involved, few vegetables were ever dried at home. During the First World War the idea was revived, but it did not get very far.

Freezing vegetables is a new idea that has already proved practical and popular. Flavor and color are retained even better than in the canning process. Already freezing establishments have been set up in many cities and towns with storage lockers available at low cost. In addition, large refrigerators are now available which will quick-freeze many kinds of produce and then keep it almost indefinitely. Unfortunately, the cost of such equipment is still high. The problem and cost of storage of the frozen products are also barriers to the universal adoption of this modern method.

Although storage definitely has its points, I believe that canning is the most satisfactory way for the average back-yard gardener to stretch the season of his garden produce. Be sure and get the latest information on the subject from your state college, or from an up-to-date vegetable cookbook.

CHAPTER

XI

PREPARATION FOR THE TABLE

The Cook Co-operates

Man has spent the past seventy-five years in taking the most valuable elements out of his food to make it look better, taste better, and keep better. Now he has got to spend the next few years in getting those elements back into his diet in the least painful manner. Meanwhile, we have turned to the capsule to get our vitamins and minerals. Some scientists have even claimed (usually for purposes of publicity) that we shall soon be able to get all the food we need in a few tablets a day.

Evidently this theory has not been sound, for during the past several years there has been a gradual but definite trend back to the foods in which Nature has so generously placed these vitamins and minerals.

More vegetables added to your regular menu will mean more vitamins, more minerals, more bulk, and more alkalinity in your diet. Naturally, you will have to like these vegetables or you certainly will not eat them. To enjoy eating them and to retain all vitamins and minerals, they must be properly prepared.

You have raised these vegetables; now you must get the full co-operation of the cook and the rest of the family. For health's sake, all concerned must be good sports in this matter and forget their prejudices and pet likes and dislikes. Those of you who are too old and set in your eating habits may hate to change them and adopt these new-fangled salads and 'half-cooked' vegetables, but when it comes to bringing your children up to follow the same vitamin-lacking diet, I think it is time something was done about it.

It is certainly encouraging to know that something is being done about this very matter, as you can readily see by reading any of the current issues of most any women's magazine and the 'Homemaker's Page' of the daily newspapers. The Government has enlisted the aid of doctors and nutrition experts throughout the country to correct as soon as pos-

sible the serious situation. The condition shown as a result of the physical examinations for the army in the First World War was not taken seriously. I venture to say that from now on you will find more attention paid to diet in our magazines, newspapers, and radio programs. The lowly vegetable has at last come into its own, for it forms an important part in this new plan. It is all so comparatively new that you will find the most helpful and up-to-the-minute methods and recipes in current publications or recently printed bulletins. Write your state college extension service for their latest material.

Here are some recent publications that I can recommend most highly:

Vegetable Cook Book. McFayden Seed Company, Winnipeg, Canada. 10 cents.

Buying, Cooking, and Serving Vegetables. Good Housekeeping Institute, New York City. 15 cents.

New Method Cooking. Aluminum Cooking Utensil Company, New Kensington, Pennsylvania. 25 cents.

Better Homes and Gardens Cook Book (loose leaf), at your bookstore, $2.

Here are some suggestions that I hope will be of interest and help to the cook:

1. Vegetables should be used as soon after picking as possible. Time is one of the elements that favor the home gardener — uncooked vegetables on the table in less than fifteen minutes and cooked vegetables in less than thirty minutes from the time they were growing! Some vegetables lose their natural sugars in a few hours after picking — especially when the temperature is high.

During hot, dry weather it may be best to harvest salad vegetables — lettuce, cabbage, and others — a few hours before using to get them crisp. Wash in cold water, wrap in damp cloth, or put in vegetable bags and place in refrigerator or other cold place. A 'vegetable-crisper' — merely a covered pan — kept in the refrigerator is the proper place to store perishable vegetables.

2. 'Color, and lots of it, seems to be the keynote of modern living,' say noted authorities on fashions, home furnishings, textiles, and plastics. It has been proved that the color of the food on your dinner table affects your family's appetite. Vegetables and fruits alone can furnish this important item — red tomatoes and beets — green spinach, peas, and beans — yellow corn and beans — orange carrots — the resourceful cook can work up an attractive combination for every main meal.

Beware of spoiling the color of your vegetables by improper cooking: Don't overcook — don't use too much water — don't cook them whole or in large pieces. All these make the vegetable unattractive in color and — what is even more important — unattractive in taste.

If you choose your vegetables for a meal from the color combination standpoint alone, you will not be far off from a balanced meal. Never use soda to preserve color; it will kill some of the vitamins.

3. Flavor is important. Vegetables are appetizing only if the valuable mineral salts and natural vegetable sugars, which impart the flavor, are retained. In the past the average cook peeled her vegetables, thus throwing away the part directly under the skin which contains the largest amount of mineral salts; then the remaining portion was boiled in a kettle full of water, which dissolved out more salts and most of the sugars and was immediately dumped down the sink. Scrub your vegetables with a stiff vegetable brush, peeling only when absolutely necessary. Use as little water as possible. Serve them as soon as they can be easily pierced with a steel fork. To overcook a vegetable is as great an offense as to overbake a cake.

No cooked vegetable is ready for the table until you have tasted it. Then add that last shake of salt or pepper and a generous lump of butter. A little cream will give just the finishing touch to carrots, peas, string beans, cabbage, and similar vegetables. A little sugar will make squash, carrots, and beets more tasty.

4. Cook your vegetables in a sturdy saucepan that has a tight-fitting cover. Use as little water as possible — this can only be determined by experimenting; even the weather has its effect on the speed with which the water boils away, and the best of cooks get caught at times. With the direct flame of gas and oil, more water will be required than when cooking with electricity or a range. The objective should be to have practically no water left when the vegetables are tender; then there will be no need for draining the precious flavor, color, vitamins, and minerals into the sink.

Greens take plenty of water before cooking (a thorough washing), but little or no additional water for cooking. You will be surprised at the amount of water that remains on the spinach after washing, and that comes out as soon as it starts to cook. Remember — vegetables are ninety per cent water.

To steam vegetables, place them in the perforated upper compartment

of a steamer over rapidly boiling water, cover tightly, and steam just until tender. In this method, some of the vitamins, minerals, and color will drip into the water. The loss will be kept low if the vegetables are not cut up. In order to get the full value from the vegetables cooked in this manner, the water should be used in making soups.

Another method frequently recommended for cooking vegetables is under pressure. The vegetable is placed in a dish with a tightly fitting cover that can be clamped in place. An adjustable valve is made in the cover to let out the steam at any desired pressure. The vegetable is placed in the dish with some hot water and the cover is fastened on. The very short time required to cook a vegetable is counted after pressure has been obtained, which itself is a matter of several minutes. The pressure must be released as soon as possible and the vegetable removed from the pan or it will be overcooked. Here also it will be necessary to use the water in which the vegetables were cooked in soups or some of the vitamins, minerals, and color will be lost.

5. The time of cooking required by a vegetable depends upon its age and freshness, the method of cooking, the heat used, and the size of the pieces. All vegetables should be cooked only long enough to make them tender. Keep that steel fork handy. It is so important that I repeat: Overcooking will make vegetables soft, mushy, dull, and lower in food value.

By slicing, dicing, or shredding your vegetables, you can cut the cooking time in half and save on color and food value. Use your ingenuity and some sort of kitchen gadget to cut your vegetables into different shapes each time you serve them. The same old vegetables served in a different form with a slightly different seasoning are almost as good as a new vegetable.

Cook your vegetables with the cover on tight for most of the cooking time — then remove the cover for the last few minutes to retain the brightness of the color and give you a chance to see that it does not boil dry. It may be necessary to add a tablespoon of water. Yes, you must tend to business when cooking your vegetables this way, but it is worth it, and is no more than you do for your cakes and pastries.

Have the water boiling when you put the vegetables in, and start counting time when the steam first begins to puff out from under the cover.

A timetable is really of little value, as it depends on the age of the vege-

table, the size of the pieces, and the quantity you are cooking. Vegetables prepared as I have suggested will be tender in from ten to twenty minutes. Your fork will tell you when they are done.

6. Raw vegetables help to keep the gums and teeth healthy. This is especially needed in this age of soft, refined, and sweet foods. You will be surprised how many children — and grown-ups, too — will eat raw vegetables with their meals. Even children who refuse to eat any cooked vegetables at mealtime will relish a stick of crispy carrot or a stalk of celery. Yes, even turnips; cauliflower is especially popular, too.

Salads

Salads offer a chance to use more raw vegetables in your meals and to add more color to your table. They should not be considered a mere accessory dish, for they are as essential as the meat or dessert. Don't just make up attractive salads for 'company' meals; make them several times a week — summer and winter. Fresh vegetable salads are appetizing, their crispness contrasts with soft foods, their bulkiness offsets the heavy, rich foods, and they give the full value of health-giving minerals and vitamins.

Hints for Salads as a Side Dish

1. The ingredients should be large enough to retain their identity. Do not try to hide a vegetable one member of the family may not like. By chopping the vegetables too fine, you may get a mush. It is best to shred vegetables for salads.

2. Do not use more than three ingredients in this type of salad. The most attractive salads are the simplest. A salad should taste as good as it looks.

3. Toss ingredients lightly; never stir. It isn't too important to have some of the dressing on every piece.

4. Always have salad greens fresh, crisp, and clean.

5. Vary the salads from day to day. Try new combinations. Use a few dark green spinach leaves or broccoli buds for color. Try a red pepper for a change. Lettuce and cabbage are not the only salad vegetables.

6. Thoroughly drain all vegetables before using.

7. Serve on dinner plate, not on separate dish.

The Salad Bowl. The Salad Bowl can also be used as an accompaniment to the main dinner course. It is convenient for either buffet set-ups or the

family dinner table. It is usually made up of several salad greens with possibly a few cold, cooked vegetables, cheese, and shellfish. These are kept separate so that each one may choose the combination he prefers. The dressing may be included in the bowl (but not on the contents), or served separately.

Hints for the Salad Bowl

1. For variety, cut some of the vegetables in slices and dice others.
2. Try endive, chives, watercress, and onions.
3. For cooked vegetables, try Lima beans, cauliflower, beets, asparagus.
4. Use fruits when the supply of vegetables is short.

The Salad Platter. There is nothing better on a hot summer day than a carefully prepared salad as a main dish. The Salad Platter, with a salad combination arranged separately in large lettuce cups, provides a most complete one-dish meal. With it have a tray of whole-grain wafers or dark bread and butter. A garnish of relishes — pickles, stuffed eggs, radishes — may be arranged around the outside of the platter or served on a separate dish.

Hints for the Salad Platter

1. Use shellfish or tuna fish, chopped ham or chicken, cooked Lima beans or string beans, to fill the lettuce cups.
2. Use individual molds made with gelatin.
3. Stuffed peppers or tomatoes make for a variety.
4. Have an extra serving or two for those hungry youngsters.

I have hardly scratched the surface with these few suggestions. You will find many attractive recipes in the pamphlets mentioned, as well as in your current magazines and newspapers. But do not be content with these; use your own ingenuity to make up salads for your own family with vegetables and fruits from your own garden.

Vegetable Cookery

Asparagus. Try preparing asparagus by cutting the stalks in one-inch pieces. Start at the tip and cut down the stalk as far as it is tender, discarding the tough base.

String Beans. String beans cook more quickly and seem a different vegetable if you slice them lengthwise — French style. A little gadget comes especially for this purpose.

Beets. Young, tender beets from your garden will not need peeling. Slice thinly or dice. Older roots — peel before cooking, then slice or dice. Do not worry about a beet's bleeding. Add a little sugar and plenty of butter. Take a look at the Vitamin A value of beet greens. I have mentioned in several places the advisability of using your beet thinnings in this way.

Broccoli. Try grating broccoli (use a coarse grater) to mix with cabbage salad. If the flavor of broccoli is a little strong for your family, try combining it with cauliflower. Cut both rather fine.

Cabbage. This vegetable has probably been abused by long cooking more than any other. Corned beef and cabbage is an old favorite that is still popular. Don't be so far behind the times that you continue to cook the cabbage as long as you do the corned beef. If you have not eaten five-minute shredded cooked cabbage with its fresh green color and flavor, you have a treat in store.

This vegetable fresh from your garden will form the base for many kinds of raw salads. It combines well with apples, celery, carrots, broccoli, cheese, peanut butter, crushed pineapple, raisins, nuts, dates, and so on.

Carrots. One of the best-liked, most colorful, and valuable of our vegetables both raw and cooked. Use when young and occasionally flavor with mint, or glaze with brown sugar.

Cauliflower. Try this raw in your next salad, or, if you cook it, don't overcook or you will have mush and an unattractive color.

Swiss Chard. Be sure that you use the leaves before they are ten inches long. Take a look at the vitamin value. Chard must be cooked carefully and used immediately or it will turn dark and be unattractive. A good summer spinach.

Lettuce. Roll up a leaf, dip one end into a dressing made from the juice of a lemon and a quarter cup of honey.

Potatoes. Baked potatoes are one of your best foods — if you eat the skins, too.

Peppers. These add flavor and color to raw salads, and are a valuable addition to swiss steaks, meat loaf, and so on.

Summer Squash. Pick it when it is young and tender and it will need no peeling.

Here is a main dish which is an inexpensive way to serve summer squash: Pour two tablespoons of olive or cooking oil into a deep skillet or saucepan. When hot, add one pound of hamburg, stir with a fork until well browned and broken up. Add two diced sweet peppers and one small onion, sliced. Cook for a few minutes, stirring often, then put in about a quart of diced summer squash — do not peel or remove seeds. Reduce heat, cover tightly, and cook for twenty to thirty minutes. Stir occasionally, flavor with salt and pepper, leave cover off last few minutes to evaporate excess moisture. Serves six.

Tomatoes. The most valuable vegetable from your garden. Grow a few yellow ones to add to that color scheme — many claim that they are less acid.

Approximate Vitamin * Value of Vegetables Compared with Some Common Foods

Foods *One serving*	*Vitamin* *A*	*B*	*C*	*G*
Asparagus, green	400	100	350	
Beans, stringless	400	50	80	
Beef, lean	70	40		100
Beets	35		100	50
Beet greens	12,000		300	250
Bread, whole-wheat	5	25		25
Broccoli	8,000		400	200
Butter	150	10		15
Cabbage, raw	550	25	600	50
Carrots, raw	3,800	10	75	50
Cauliflower	50	30	600	60
Chard, Swiss	12,000		300	250
Dandelion greens	18,000		700	75
Egg, one	600	15		60
Grapefruit, one-half		40	1,200	40
Kale	20,000	10	700	200
Lettuce, green	1,500	15	100	25
Milk, whole, pasteurized	500	50	50	250
Oatmeal		75		20
Orange juice	200	50	1,200	75
Peas, green	800	100	150	100
Potatoes, white	80	50	400	50
Potatoes, sweet	5,200	25	250	50
Spinach	17,000	25	450	100
Tomatoes, ripe, cooked	1,000	35	300	

* Vitamins A, B, and C are given in international units; G is given in Sherman units. The sun provides your Vitamin D.

CHAPTER

XII

FLOWERS IN THE VEGETABLE GARDEN

A Beauty Treatment

You will find it pleasant and easy to grow flowers alongside your vegetables. They add a touch of gaiety to the more humdrum vegetables, give you a profusion of cut flowers for your home, and will probably do even better than the ones in your regular flower garden.

What shall it be — a short border of dwarf plants such as ageratum and alyssum, a medium-tall border of zinnias and marigolds, a tall border of dahlias, or a row of mixed cutting annuals for the special purpose of providing flowers for arrangement in the house? The vegetable garden is an especially good place for dahlia or gladiolus. Either can be planted in rows right along with the vegetables.

Annual flowers naturally fit best into the vegetable-garden plan. Most of them are easily grown from seed sown directly in the row, then thinned out and cultivated the same as the vegetables.

Small Informal Vegetable-Flower Garden

This garden is planned for those who have a limited area or a limited amount of time to spend in their garden. This type of garden with short, straight rows requires comparatively little attention and yet will produce a surprisingly large crop. It can easily be made almost any desired size by using the vegetable garden plans in Chapter III as a basis. I have made this particular garden a little more than half flowers.

Small Informal Vegetable-Flower Garden 20 × 25 (500 sq. ft.)

Rows 15 inches apart — Planting dates approximate

Scale: 1 inch = 6 feet

No. ft. from Edge	*No. of Row*				*Plant*
	1	10 Pole beans at 2 ft.			June 1
	2	Carrots	Beets		May 1
	3	10 Tomatoes at 2 ft.			June 1
5	4	String beans			May 1
	5	10 Tomatoes at 2 ft.			June 1
	6	Lettuce			May 1
	7	10 Dahlias at 2 ft.			June 1
10	8	Peas			May 1
	9	Aster seed or plants			May 15
	10	Radish, May 1	Radish		May 15
	11	Zinnia seed or plants			May 15
15	12	Space needed for adjoining plants			
	13	Gladiolus, May 1	Gladiolus		May 15
	14	Scabiosa	Stocks	Snapdragon	May 15
	15	Gladiolus, June 1	Gladiolus		June 15
20	16	Dwarf Dahlia			May 15
	17	Rudbeckia	Larkspur		May 15
	18	Dianthus	Calendula	Dwarf Marigold	May 15
	19	Cosmos	Marigold	Scabiosa	May 15

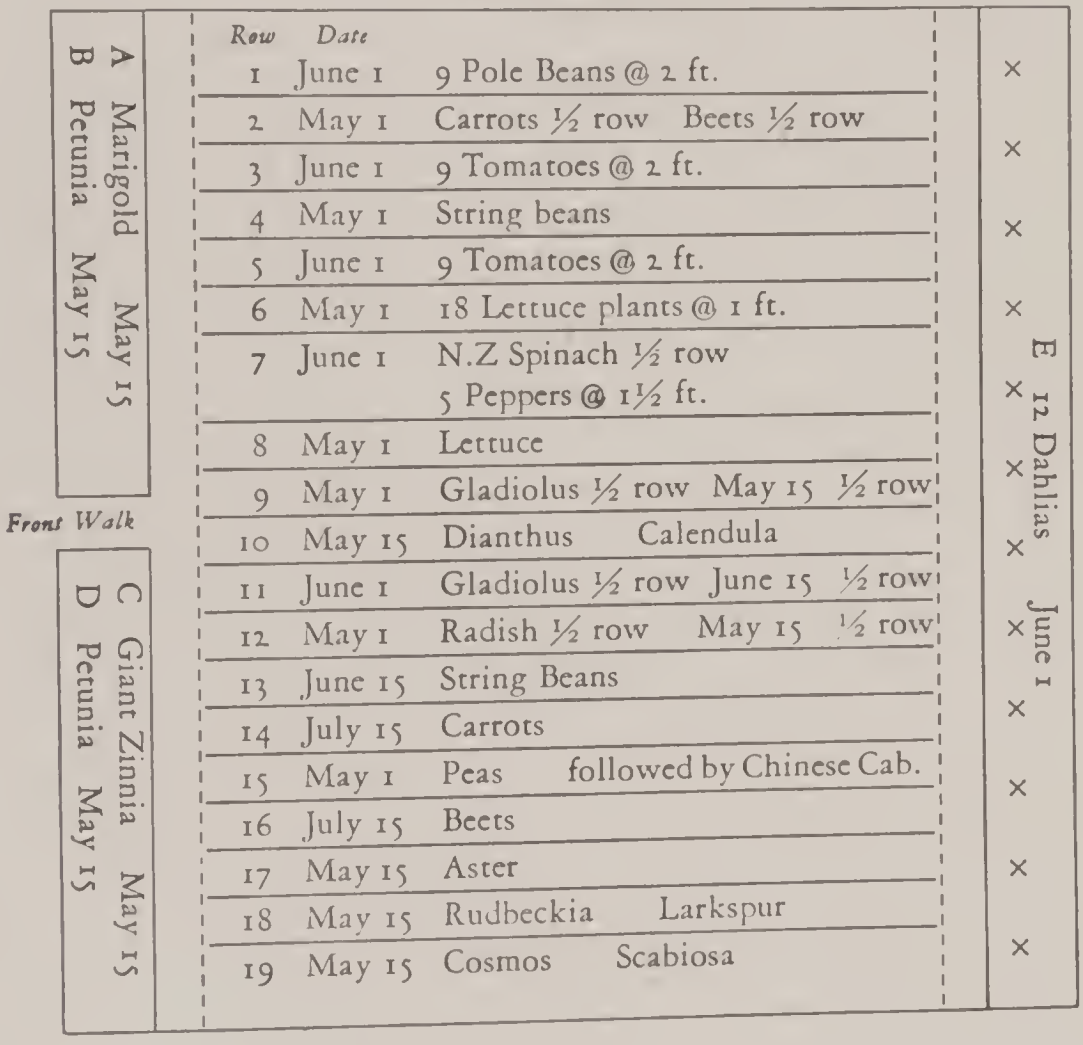
Small Semi-Formal Vegetable-Flower Garden

Gardeners who desire a little formality in their back-yard garden can use this plan. It will blend in well with a house and yard where the lines are severe — straight, well-pruned hedges and colonial-type houses. The border planting of petunias will frame the garden with color from July to frost. I have made the garden about half flowers, but you can easily change the plan to suit your desires by using the vegetable-garden plans in Chapter III as a basis.

Small Semi-Formal Vegetable-Flower Garden 25 × 25 (625 sq. ft.)

Rows 15 inches apart — Planting dates approximate

Scale: 1 inch = 6 feet


A Marigold May 15
B Petunia May 15
Front Walk
C Giant Zinnia May 15
D Petunia May 15
Row Date
1 June 1 9 Pole Beans @ 2 ft.
2 May 1 Carrots ½ row Beets ½ row
3 June 1 9 Tomatoes @ 2 ft.
4 May 1 String beans
5 June 1 9 Tomatoes @ 2 ft.
6 May 1 18 Lettuce plants @ 1 ft.
7 June 1 N.Z Spinach ½ row
5 Peppers @ 1½ ft.
8 May 1 Lettuce
9 May 1 Gladiolus ½ row May 15 ½ row
10 May 15 Dianthus Calendula
11 June 1 Gladiolus ½ row June 15 ½ row
12 May 1 Radish ½ row May 15 ½ row
13 June 15 String Beans
14 July 15 Carrots
15 May 1 Peas followed by Chinese Cab.
16 July 15 Beets
17 May 15 Aster
18 May 15 Rudbeckia Larkspur
19 May 15 Cosmos Scabiosa
E 12 Dahlias June 1

Formal Vegetable-Flower Gardens

A formal garden requires extra labor, as it usually has grass walks that must be kept cut and the edges trimmed at frequent intervals. Short rows and angles also increase the amount of work involved. It makes an attractive garden, however, for a small back yard or for a corner in a large grassed area.

I have made two plans which are quite different in their treatment. For best results, flower *plants* should be used in the formal gardens and vegetable *seed* (except where specified).

PLAN A

This one consists of four equal-sized plots with the two front sections mostly flowers. The round plot in the center can be omitted if desired and the area grassed over, or a bird bath or sundial used as a center of interest.

I have suggested a border of petunias along both sides of the center walk. This may be continued all around the plots if desired. A permanent border of privet or euonymus twelve to fifteen inches tall may be used to outline the sections, adding to the formality, but cutting down on the space available for annual crops.

The round bed can be planted to roses or other perennials, or even used for tomato plants or pole beans.

Plan A

Formal Vegetable-Flower Garden A 28 × 30 (840 sq. ft.)

Scale: 1 inch = 6 feet

Front

1	Petunia	May 15	
2	Aster	May 15	
3	Lettuce	May 1	
4	Cosmos	May 15	
5	Carrots	May 1	
6	Tall Marigold	May 15	
7	Beets	May 1	
8	Rudbeckia	May 15	
9	Gladiolus	May 1	

Grass Walks

Petunia	May 15	28	
Larkspur	May 15	29	
Snapdragon	May 15	30	
Lettuce	May 1	July 15	31
Dwarf Marigold		May 15	32
Cab. Plants	May 1	Beets July 15	33
Calendula		May 15	34
Dwarf Dahlia		May 15	35
Gladiolus		June 1	36

Grass Walks

19	Petunia	May 15	
20	Scabiosa	May 15	
21	Carrots	July 15	
22	Peas	May 1	
23	7 Tomato Plants	June 1	
24	Peas	May 1	
25	7 Tomato Plants	June 1	
26	Radish	May 1	
27	7 Pole Beans	June 1	

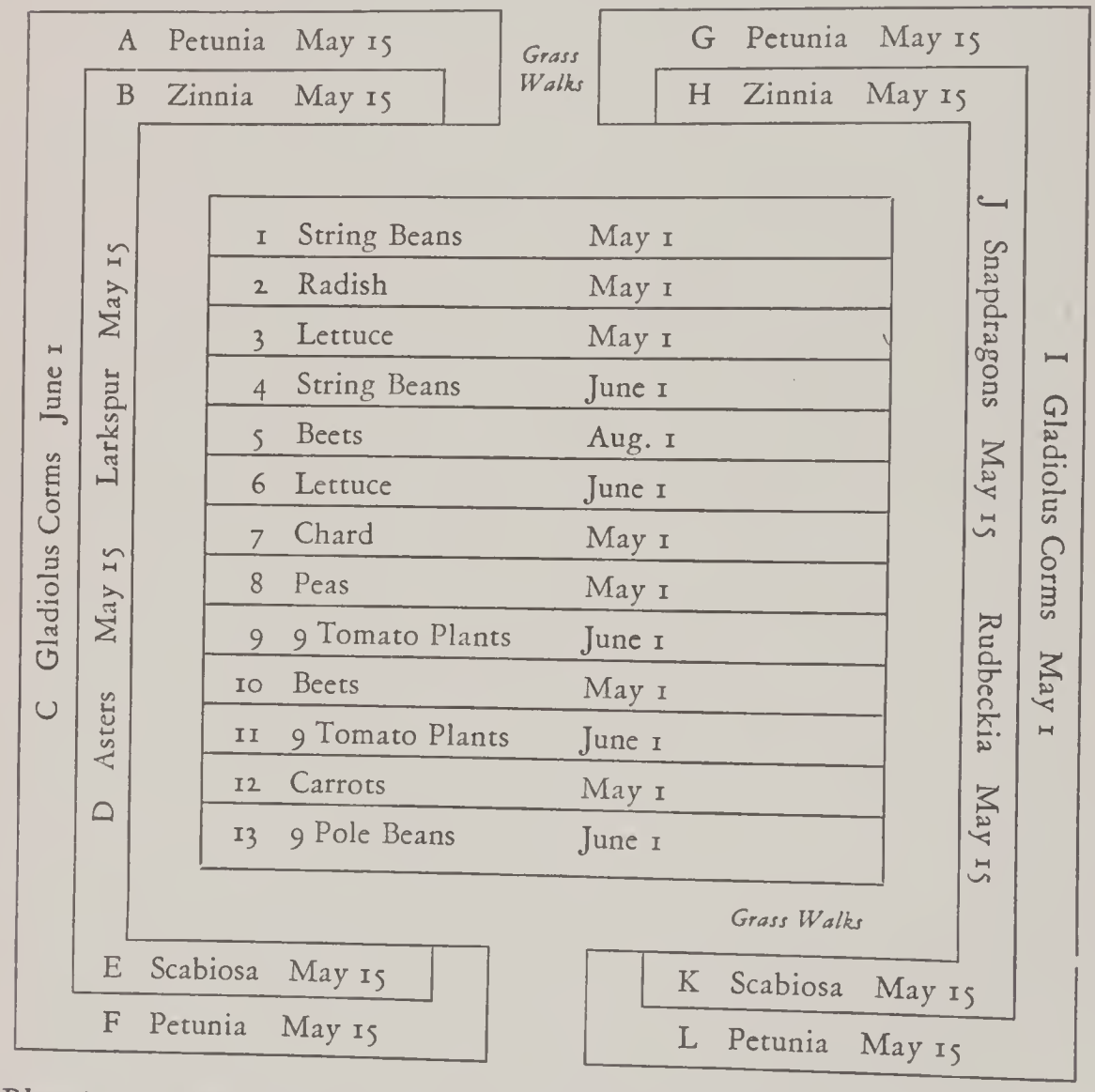
10	Petunia	May 15	
11	Zinnia	May 15	
12	Chard	May 1	
13	Parsnips	May 1	
14	7 Tomato Plants	June 1	
15	String Beans	May 1	
16	7 Tomato Plants	June 1	
17	String Beans	May 1	
18	7 Pole Beans	June 1	

Plan B

A border of flowers frames a plain vegetable garden here. I have suggested annual flowers in this border, but perennials may be used if desired. A permanent hedge of any desired height could be used around the outside — try arborvitae, privet, or euonymus.

Formal Vegetable-Flower Garden B 28 × 28 (784 sq. ft.)

Scale: 1 inch = 6 feet


A Petunia May 15
B Zinnia May 15
Grass Walks
G Petunia May 15
H Zinnia May 15
C Gladiolus Corms June 1
D Asters May 15
Larkspur May 15
1 String Beans May 1
2 Radish May 1
3 Lettuce May 1
4 String Beans June 1
5 Beets Aug. 1
6 Lettuce June 1
7 Chard May 1
8 Peas May 1
9 9 Tomato Plants June 1
10 Beets May 1
11 9 Tomato Plants June 1
12 Carrots May 1
13 9 Pole Beans June 1
J Snapdragons May 15
Rudbeckia May 15
I Gladiolus Corms May 1
Grass Walks
E Scabiosa May 15
F Petunia May 15
K Scabiosa May 15
L Petunia May 15

Planting. Most flower seeds are small and therefore require extra care in sowing. Some are so fine — such as snapdragon and petunia — that it is usually best to start them in a flat, a pot, or a specially prepared bed, and transplant into individual containers, then set them out in the garden.

For Those to be Planted Directly in the Garden. First rake over the place where the row is to be made, in order to break up the lumps and remove stones and trash. Then, using the line to mark the row, use the hoe handle or a corner of the hoe to open a small furrow — less than a half-inch deep if possible. If the soil is dry or light, I have found it best to make a furrow by lightly pressing down along the line with the back of the iron rake. Sow the seed quite thickly and as evenly as possible. Cover carefully and firm the soil over the seed with the back of the hoe.

Directions for the growing of vegetable plants apply also to flowers. (See Chapter IX.)

Cultivation. The soil requirements for most flowers are the same as for vegetables. Follow the directions I have given for preparing the soil for vegetables. In other words, give the whole garden area the same treatment. Keep the weeds down.

Thinning. Each plant must have sufficient room to grow if it is expected to produce good blossoms. How much room do the plants need? See the table and thin out the plants to the required distance before the seedlings begin to crowd. In the case of many of the annuals, it is possible to transplant some of these extra plants to some other garden. Care should be used to keep as much soil as possible on the roots and protect the plants for a day or two from the sun and wind.

I have seen the following method of obtaining earlier and more blossoms tried with considerable success: Thin out the seedlings to about an inch apart. This will result in crowding, but such plants as zinnias, larkspur, marigolds, and others will send up a single stalk that will produce a good-sized flower much earlier than when the plant is disbudded. The flower will also have a longer stalk. A second crop of blossoms will grow on most of the plants, though rather slowly.

Disbudding. For a good husky plant, nip out the central flower bud as soon as it appears. This will result in more and larger blooms with longer stems. Of course, it means that the first blossoms will be later in developing. (An illustration of this appears on page 69.)

Picking. All plants blossom to produce seed. When they have done this, their reason for living is gone. Therefore, it is important to prevent your plants from growing any seed, unless, of course, you are deliberately saving some of the seed for your own use. Pick off all flowers as soon as they start to go by. The more flowers you cut for use in your home and to share with friends and neighbors, the more your plants will produce.

Pest control. Many of the common pests of annual flowers will be the same as those that attack the vegetables. The regular applications of rotenone dust should be made on the flowers as well as the vegetables. If this is done regularly and properly, you will have little trouble from insects. The cutworm bait should be distributed along the row as soon as the seedlings appear or around the plants as soon as — or better, before — they are set.

Mildews and rusts can be controlled by the use of copper or sulphur. Be careful not to get the sulphur on the vegetable plants; it may burn.

Cultural Directions for Most Popular Annuals

Asters. The China aster is one of the most popular of the annuals for cut flowers. Its long stems, brilliant colors, excellent lasting quality, and the fact that the blossoms are not easily damaged have made this flower a garden favorite. For early blooms, the seeds should be started indoors. Seed planted directly in the row in the garden as soon as heavy frosts are over (May 10) should provide flowers in about one hundred and twenty days (about September 10). Thin the seedlings or set the plants about a foot apart. Asters are relatively easy to grow; the seeds and seedlings are of fairly good size and easy to handle. The chief drawback in the culture of this beautiful flower is its susceptibility to a number of serious pests.

Aphis. Leaf aphis are easily controlled by rotenone, pyrethrum, or nicotine. *Root aphis* are not easily controlled, once established. Control the ants first. Mix tobacco dust with the soil before planting the seed or setting the plants.

Blister beetles eat the flowers. Frequent applications of rotenone or pyrethrum are necessary.

Tarnished plant bugs sting the stems. Dust frequently with rotenone or pyrethrum.

Stem rot or *wilt* occurs at the ground level and causes the whole plant to wilt. Plant wilt-resistant varieties. Watch the watering.

Yellows or *mosaic* attacks any part of — or the whole plant. It stunts the growth and the leaves turn yellow. It is a virus disease for which there is no cure. The virus is spread from infected weeds by a leaf-hopper which can be controlled only by covering the asters with a tent of aster cloth.

Asters come in many sizes, types, and colors. Pick your own.

Aster plants do not need to be nipped or disbudded to make them stocky.

Calendula. This cool-weather flower should not be planted so that it will come into bloom during hot weather. Start the seeds indoors for early blooms. If your garden is in a hot spot, you should not plant calendula seeds until the last of June. If the early fall frosts are not too severe, you can sow them up to July 20. As the seeds and seedlings are of good size and make a fairly quick growth, calendulas are quite easy to grow. Space the plants about ten inches apart.

Cosmos. Earlier and larger blossoms are now available in both pink and white. Easily raised from seed, cosmos can be planted from May 1 to July 20. Thin out the seedlings to about ten inches apart. Plant the Sensation varieties. Also try some of the double-crested cosmos.

Dahlias. The vegetable garden is the ideal place to grow dahlias. Do not be in too much of a hurry to plant the bulbs or plants. The dahlia flowers are likely to be better during cool weather. If you are able to grow some early plants, be sure and plant some dwarf dahlia seed, especially some of the new Vossberg hybrids. I believe these dwarf dahlias make one of the very best cut flowers. It is not advisable to plant dahlia seed directly in the garden. Dahlia tubers are not too easy to keep over the winter.

Gladiolus. The corms are inexpensive, easy to grow, easy to keep, and multiply each year. Innumerable shades of various colors are available and no flower will stand as much rough treatment after cutting. What more could be desired? Unfortunately, the gladiolus thrips has come to spoil the pleasure of the 'glad' fan. The pest is not easy to control. Outside of treating the bulbs with naphthalene flakes or corrosive sublimate, constant spraying with rotenone or the following formula is recommended:

	Small Quantity	*Large Quantity*
Tartar emetic	1 oz. (2 tablespoons)	½ lb.
Brown sugar	2 oz. (6 tablespoons)	1 lb.
Water	3 gal.	25 gal.

I make a trench four to six inches deep and four to six inches wide. Then I plant my blossom-size corms — all over an inch in diameter — on the bottom of this trench, allowing each corm about three inches. These I cover with an inch or two of soil. The cormels — or baby corms — are then spread on top of this and in turn covered with an inch or two of soil. As soon as the plants are a foot high, I drive stakes every twelve

to fifteen feet and run a light wire (number 18) down each side of the row to keep the plants from falling.

For a succession of blooms, plant your corms from May 1 to June 15. After the plants are frosted, dig them up, cut off the tops, dry them throughly, and store them in a cool dry place.

Larkspur. This annual is not too easy to raise, as the seedlings are somewhat delicate. The colors are excellent and the stems good. The flower is a little soft and will not stand rough treatment. Start the seed indoors or plant it early, directly in the row — May 1. Space the plants about eight inches apart.

Marigolds. Most of the tall marigolds make good cut flowers — if you object to the old marigold odor, be sure to get the new odorless varieties. Marigold seed and seedlings are good-sized and therefore easy to grow. The plant has few pests of serious nature. If you plan to sow the seed directly in the garden, be sure to get the early flowering varieties. Plant the seed in early May and space the plants about twelve inches.

Rudbeckia. This comparatively new flower is a glorified 'black-eyed Susan.' Try a few and I know you will be pleased. Plant the seed in May and space the flowers about eight inches.

Scabiosa. New varieties have widened the range of color and size of plant. Dwarf varieties fifteen inches high and tall varieties three feet high are available. Fairly easy to grow, you can plant the seed directly in the garden any time in May. Allow each pincushion plant about eight inches.

Snapdragon. The seed is so small it is necessary to plant it under ideal conditions. The seedlings should be moved to separate containers and then set in the garden about the first of May. Plant the rust-resistant strains, as this disease is serious. There is no cure for the stem-rot or wilt, which is very much like the aster wilt in its effect on the plants. Space the plants twelve inches apart in the rows and be sure to pinch them back when they are about six inches tall.

Sunflowers. In the vegetable garden you can grow either the large, tall, parrot-seed sunflowers, or the new dwarf varieties that are easy to grow and make excellent cut flowers. Seed sown in May will produce plants three to five feet tall, bearing long branches with lovely yellow blossoms. Thin the plants to eighteen inches apart.

Sweet Peas. It is the ambition of most gardeners, at one time or another, to grow some good sweet peas. The seed must be planted early — before

April 20 — for the best results. Sweet peas must have cool temperatures up to the time the blossoms open. Plant them along with the garden peas — on new land if possible. Provide some support for the plants to grow on. Watch for aphis. I plant the seed in a furrow three to four inches deep, cover the seed about a half-inch, and fill in as the plants grow.

Zinnias. One of the showiest and easiest to grow of all annuals. Many types are now available. Plant the seed in May or June and thin the plants to about ten inches. Be sure to pinch out the center bud.

FLOWER TABLE

Annual Flowers	Number of Days from Planting Seed to			Hardy Half-Hardy or, Tender	Distance (Inches) Between		Height (Inches)	Use	Special Notes
	Germination		Flowering						
	Indoors	Outdoors	Outdoors		Plants	Rows			
Ageratum	14	18	70–80	hh	10	12	6–12	Border	Edging type should be sheared; long period of bloom.
Aster, China	7	15	90–100	hh	15	24	20–24	Cutting	Excellent cut flower; many types; yellows serious.
Baby's-breath	7	12	30–40	h	12	18	18–24	Cutting	Several sowings.
Bachelor's button	7	12	70–80	hh	12	18	15–18	Cutting and decorative	Available in several colors.
Calendula	5	10	70–80	hh	12	18	12–15	Cutting	Prefers cool weather.
California Poppy	5	8	50–60	h	10	12	8–12	Decorative	Several colors; keep from seeding.
Candytuft	5	8	50–60	t	8	12	8–10	Border	Two types; several colors.
Carnation	10	15	90–100	h	12	12	12–15	Cutting	Start early; fragrant.
Cosmos	5	8	60–70	h	15	24	36–48	Cutting	Sow early varieties.
Cynoglossum	12	16	70–80	h	15	18	18–24	Decorative	Try Firmament.
Dahlia, dwarf	7	12	90–100	t	15	18	18–24	Cutting	Vossberg's Unwins Coltness hybrids.
Dianthus	10	14	70–80	h	12	15	12–15	Decorative	Long period of bloom; keep from seeding.
Gaillardia	10	14	80–90	h	12	18	15–24	Cutting	Vivid colors.
Larkspur, annual	14	18	100–110	h	12	18	18–30	Cutting	Plant seed in fall; requires nursing at first.
Marigold	5	8	70–80	h	12	24	12–30	Cutting	Many types.
Morning-glory	5	10	60–70	t	Vine			Decorative	Heavenly Blue; Arbor — old stumps.
Nasturtium	5	10	60–70	t	12	15	12–15	Cutting	Prefers poor soil.
Nicotiana	5	10	60–70	h	10	18	15–18	Decorative	Long period of bloom; Affinis hybrids.
Petunia	10	15	70–80	hh	10	18	10–18	Decorative	Long period of bloom.
Phlox drummondi	7	12	40–50	h	10	15	10–12	Decorative	Brilliant colors.
Portulaca	5	10	60–70	t	8	12	6–8	Decorative	For hot, dry spots.
Rudbeckia	7	12	70–80	h	12	18	18–24	Cutting	A must for your garden.
Salvia	7	12	90–100	t	12	18	18–24	Decorative	Try Blue Bedder.
Salpiglossis	7	12	70–80	t	10	18	18–24	Decorative	Requires nursing
Scabiosa	10	18	100–110	t	10	12	18–30	Cutting	New dwarf strains earliest.
Snapdragon	9	18	80–90	h	10	18	15–20	Cutting	Plant rust resistant strains.
Stocks	7	12	70–80	h	10	12	12–18	Decorative	Start early; several colors.
Strawflower	7	12	70–80	h	12	18	18–24	Dried	Cut when half-opened.
Sunflower	7	12	70–80	h	15	30	36–48	Cutting	Double and single.
Sweet pea	7	15	70–80	h	2	30	36–54	Cutting	Start early; fussy.
Sweet sultan	7	12	70–80	hh	12	18	15–20	Decorative	Fluffy, fragrant flowers.
Verbena	9	16	80–90	hh	10	18	10–12	Decorative	Beautiful colors; early strains.
Zinnia	5	8	60–70	h	12	18	12–24	Cutting	Many types; good hot weather flower.

APPENDIX A

Detailed Information on Your Soil and the Use of Lime and Fertilizer

During the past five years I have tested over two thousand samples of soil each year. More than a quarter of these were from back-yard vegetable gardens. Most of them tested acid and low in plant food and were of a very poor texture. My recommendations have been about as follows (all figures are per thousand square feet):

1. Broadcast forty pounds of ground limestone and forty pounds of sixteen per cent superphosphate.
2. If at all possible, spread some sort of organic matter over the area (preferably manure).
3. Plow or spade these in, mixing them thoroughly with the soil.
4. Broadcast twenty pounds of hydrated lime or forty pounds of ground limestone and harrow or rake it in.
5. Broadcast fifty pounds of some complete commercial fertilizer, a 4–12–4, or 5–15–5 if manure was used; otherwise a 5–8–7 or 5–10–5, and harrow or rake this in at right angles to the first leveling.

The first three operations can be done in the fall if desired.

This can all be done without any need for waiting and the seed immediately planted if desired, all within the hour.

Each year thereafter:

1. Spread some sort of organic matter.
2. Plow or spade it in.
3. Broadcast lime (if needed) to keep a pH of 6.3, or slightly acid.
4. Broadcast fifty pounds of the complete commercial fertilizer and harrow or rake it in.

The Soil

For purposes of examination, make a hole about twelve inches deep in the place you intend to make your garden. You will probably find a layer of topsoil or loam from six to ten inches deep. This will probably be a little darker in color and softer in texture than the next layer, or subsoil. All soil is made up of stones, gravel, sand, silt, clay, and organic matter. If the first three constitute the greater proportion of the soil, we call it sandy or gravelly — a light soil. If the last three make up the greater proportion, we call the soil silty or clayey — a heavy soil.

The ideal soil is difficult to define. It would be about as follows: free from all stones, of a dark color when dry, containing not over fifteen per cent clay, not over thirty per cent coarse sand, and more than ten per cent organic matter.

A good loam:

Coarse sand	15 to 30 per cent
Fine sand	15 to 30 per cent
Silt	10 to 25 per cent
Clay	5 to 15 per cent
Organic matter	10 to 25 per cent

If you are curious about the approximate composition of your soil, put about a pint of the topsoil in a quart milk bottle, taking out all stones larger than a quarter-inch in diameter and pieces of roots and sticks. Fill the bottle with water and shake it thoroughly. Turn it upside down and then right side up. Let it settle for a few minutes and you will see the various layers of material. The coarse sand or stones will be at the bottom. Higher up you will notice the sand grow finer, then the silt and clay mixed with the organic matter. Some clay will remain in suspension if you have a clayey soil. This will finally settle down on the lighter particles of organic matter.

The Sandy Soil. This type of soil is preferred by most vegetable growers. It is well drained, warms up earlier, is easy to cultivate, dries out quickly after a rain, transplanting is easier, and there is less compacting of the soil during planting, cultivating, and harvesting. Of course, much depends upon the size of the sand particles and the proportion of each size present. The coarser the sand, the greater the drainage and the more trouble from lack of water during dry periods.

The Clay Soil. Clay and silt particles are very fine, making a compact soil which is just the opposite to the sandy soil in all respects. Consider yourself fortunate if your topsoil is fairly deep (at least eight inches) and neither too sandy nor too clayey. It may seem odd, but the remedy for both extremes is the same — the generous use of organic matter.

Organic Matter

This valuable material has properties which provide body to a light soil and lighten up and aerate a heavy soil. It holds the moisture between rains and prevents the soluble plant food from leaching out. It provides food for necessary soil bacteria and, as it is rotted down by them, itself becomes plant food. Barnyard manure is the most satisfactory source of organic matter. In addition, this valuable material provides plant food and many of the vitamins and hormones so much discussed at this time. Other sources of organic matter are compost, seaweed, peats of various kinds, and green-manure crops.

The amount of organic matter in the average soil is very small — considerably less than ten per cent. Each year the soil is cultivated and a crop taken off, the organic matter grows less. This process is a slow one, much slower than many would have you believe. On the other hand, a good gardener who would like to build up the organic content of his soil will find the process equally slow. If he wants to do it quickly, it is rather expensive. It is estimated that the annual application of at least four cords of manure per acre or the turning under of a heavy growth of a cover crop will just about maintain the soil organic content. In other words, if you intend to improve your soil texture by adding organic matter, it is going to take a large amount to have any great effect.

A light, sandy loam or a heavy, clay loam may contain only three to five per cent of organic matter, whereas, a black, peaty soil may contain more than ninety per cent organic matter.

Manures

Barnyard manures have long been the main source of organic matter and plant food in the intensive production of vegetables. Horse manure was formerly considered most satisfactory for growing the fussier crops, such as celery, spinach, and beets. It was supposed to make the soil warmer and was also easier to handle. Cow manure was used for the coarser crops, such as corn and squash. Now, a grower should consider himself fortunate to get either kind of manure. A fairly good quality of fresh manure can usually be purchased, delivered, for fourteen dollars per cord of horse manure and twelve dollars per cord of cow manure. Rotted manure is difficult to obtain at any price. I believe the fresh manure is best, and suggest that, if it is possible, a little should be turned under every year or at least every other year. This treatment is especially valuable if the soil conditions are not too good.

The average cord of fresh manure contains approximately:

Water	2700 pounds
Organic matter	1240 pounds
Nitrogen	22 pounds
Phosphorus	11 pounds
Potash	22 pounds
Other plant food	5 pounds
Total	4000 pounds

A good application of manure would consist of about twenty-two cords to the acre or a cord to two thousand square feet of garden area. This would provide almost an inch of organic matter. Those of you who use this amount will not need to use much commercial fertilizer. I suggest the application of one hundred pounds of superphosphate to two thousand square feet. Used for

several years, this treatment should build up the texture and plant food of the poorest soil.

A light application of manure would be about four cords to the acre or a half cord to five thousand square feet. This would just about maintain the organic content of the soil. It would not provide much plant food, so it should be supplemented by a generous application of a complete chemical fertilizer with a high phosphorus content, such as a 4–12–4 or 5–15–5. About thirty pounds per thousand square feet should be applied broadcast and harrowed or raked in just before setting out the plants or sowing the seed. Manure can be harrowed or plowed in just before winter or plowed under in the spring. In the spring the fertilizer can then be worked in and the garden immediately planted.

Poultry manure must be handled with caution in the vegetable garden. With its high nitrogen content, it causes a rank growth of most crops, delaying maturity and forcing the leaf growth at the expense of root or fruit. Excellent for asparagus, celery, cabbage, and similar crops, it should be supplemented by superphosphate, one hundred pounds per cord or about a pound per bushel. The actual value of poultry manure depends upon the proportion of droppings and litter. This also determines the rate of application. The higher the percentage of droppings, the stronger the nitrogen and the smaller the quantity that can be used with safety. If you have it on hand or can get it inexpensively, use it — but with caution.

Compost or Artificial Manure. In this country the compost pile or pit has never been a part of the general farm practice, and so it is something entirely new to the average farmer. In countries where land is expensive and organic matter scarce, the compost pile is an integral part of the standard farming operations. The only places in this country where a compost pile could heretofore be found were the private estates with gardeners from 'the Old Country' and the florist who grew potted plants. The few exceptions were growers who brought the compost habit from other lands. It is most encouraging now to see so many amateur gardeners sufficiently interested in their gardening to maintain a compost pile.

Undecomposed organic matter is usually not satisfactory for direct use on the soil because: (1) the coarse particles do not mix readily with it, causing excessive aeration and making it difficult to cultivate; and (2) the growth of soil bacteria is greatly stimulated; as these micro-organisms will use up the available nitrogen, the vegetables will suffer from lack of this necessary food.

The compost pile or pit is made for breaking down, decomposing, or rotting this coarse organic matter, much of which is now thrown away. Allowed to follow Nature's way, this breaking-down process may take considerable time. With some encouragement the decomposing bacteria will speed up the process

so that the material soon becomes a usable 'humus' — or rather an 'artificial manure,' for it is a humus plus considerable plant food. The encouragement consists of chemicals to provide food and congenial conditions for the bacteria, moisture, so necessary for all plant and animal life, and an occasional turning of the pile to make the resulting material even in texture. Leaves, hay, grass clippings, and flower and vegetable refuse that is not too badly diseased can be used. Some gardeners even put in much of their garbage.

Make the pile in a secluded corner, behind the garage or close to a wall. Some dig a hole for the purpose, while others use a large wooden or wire crate. One aesthetically minded gardener told me that he built a U-shaped stone wall for his compost pile and planted woodbine around it! From the house it looks like an old well. The pile should be near a water supply, if possible. It is best to start a new pile each year so that fresh material will be kept separate from that almost ready to use.

In order to provide congenial conditions for the decomposing bacteria, limestone and superphosphate are used. Sulphate of ammonia supplies their food (nitrogen). The formula developed from extensive experiments consists of six parts of sulphate of ammonia, three parts of sixteen per cent superphosphate, and four parts of ground limestone. As it is not only difficult but also expensive to purchase these chemicals separately, I suggest the following mixture:

Any complete chemical fertilizer (such as 5–8–7 or 4–12–4), ten pounds.

Ground limestone, two pounds.

Be sure that the lime you use is *ground* limestone and not hydrated lime. Wood ashes should not be used in the pile, as they contain active lime also.

The waste material should be arranged in layers, coarse material ten to twelve inches and fine material four to six inches deep. A layer of loam an inch deep may be applied on each layer to hold it down as well as to provide a more easily handled material. A little fresh horse manure now and then will act as a starter and hasten decomposition. As new material is added to the pile, it should be sprinkled with the chemicals at the rate of about one pint to each two bushels (a wheelbarrowload). As more material is available, add to the pile until a height of three to four feet is reached; then start a new pile. Keep the top of the pile level, or slightly indented.

Do not expect immediate results, as it takes from six to eight months of warm weather to break down the refuse (coarse material takes twice as long). For an even texture the pile should be turned over at least every three months. The pile should be kept moist but not wet. As little action takes place in the pile when the temperature is below 45° F., do not reckon time when low temperatures prevail, and do not expect the leaves you piled up last fall to be ready to use this spring.

Seaweed. If you live near the ocean you may be able to get some seaweed to

add to your compost pile or put on the garden and plow under in the fall. Seaweed is rather hard to handle and slow to decompose. It is a good source of organic matter, although the plant-food content is very small.

Peat. During the past few years the use of imported peat in the growing of all kinds of plants has greatly increased. The large bales of peat moss became a common sight wherever gardening was under way, particularly around city and suburban homes. Probably only a comparatively small proportion found its way to the vegetable garden, but some growers found it to be as satisfactory in the growing of better vegetables as for flowers and shrubs.

Soon after the declaration of war in the fall of 1939, the imported peat was no longer obtainable. Peat-importing concerns sought a native supply and found extensive areas of peat very much like the imported type in Canada and the northern border states. The business is already well under way in Maine and Wisconsin. This peat is now available in bales, and to all intents and purposes will take the place of the imported peat.

Many bog-owners have found some peat in their own back yards and are trying to market it. With thousands of acres of peat well scattered throughout our country, it is time we turned to these near-by deposits for our supply of organic matter. In some sections there are already bog-owners who are ready to deliver either a coarse brown peat or a fine black humus for from two to four dollars per yard. The price naturally depends on the quantity ordered and the distance it must be hauled. It is delivered in bulk.

I find that the majority of gardeners look with considerable suspicion on this material. They claim it is 'sour' and therefore definitely harmful to cultivated plants. It is acid; but lime is cheap and organic matter is very necessary.

No definite physical or chemical composition can be given for this native peat because one deposit differs from another. Both the brown, spongy or fibrous type and the black, disintegrated muck forms are excellent soil-improvers. Leaf mold, although essentially different from the others in its origin, is not very different in its content and its uses.

Most of these materials will prove of great value as a source of organic matter in the vegetable garden. They may be incorporated with the soil or used as a mulch around the larger vegetable plants, such as cabbage, tomatoes, and pole beans. As in the case of flowers or shrubs, an inch and a half of peat covering the ground will keep the moisture in, keep the weeds down, and make it unnecessary to cultivate for the season. Then it can be incorporated with the soil to increase its organic content. A cubic yard will cover about three hundred square feet an inch deep.

The peat will vary in acidity from pH 3.0 to pH 6.0, and if any great quantity is to be used, you should know the approximate acidity. Ordinarily two to three pounds of hydrated lime will correct the acidity of a cubic yard. Very

little plant food will be found in the peat, so a complete commercial fertilizer should always be used with it; from three to four pounds of a 5–8–7 or 4–8–10 mixture will do for each yard used. If the peat is mixed with the garden soil as a source of organic matter, the regular annual lime-and-fertilizer treatment will take care of the acidity and lack of plant food.

Green-Manure and Cover Crops. Although these terms are commonly used interchangeably, they actually refer to crops used for a different purpose. Cover crops are primarily planted to protect the soil from erosion by wind or water. Other benefits are: (1) to act as a green-manure crop; (2) to prevent the loss by leaching of soluble plant food which is taken up and later released to the soil as the crop decays; and (3) to provide a more sightly garden area during the long winter season. Winter rye is the most valuable cover crop and should be planted whenever and wherever possible. As a section of the garden becomes clear, either from the killing of plants by frost or because crops are mature, the rye seed should be broadcast and scratched into the ground with an iron rake or tooth cultivator. This can be done any time in the early fall. Use about a half-pound of seed to each hundred square feet.

Green-manure crops are planted primarily to be turned under to improve the soil. The best crop for this purpose depends upon the length of time available for growing the crop. Buckwheat is commonly used where the time is short, and soy beans where a whole season is available. Buckwheat can be planted from May 15 to August 15 and takes but five or six weeks to mature. Seed is broadcast — about a half-pound per hundred square feet — and scratched in for better germination. This crop grows so fast that it is mostly water, adding very little actual organic matter to the soil. Soy beans can be planted from May 25 to July 1 and take about three months to mature. As a legume, the seed must be inoculated with bacteria before it is planted. Be sure to purchase the inoculant when you buy the seed; full directions will accompany the material. Broadcast about a pound of the soy beans per hundred square feet and scratch into the soil so that the seed is well covered. Considerable organic matter will be added to the soil by a heavy crop of soy beans.

When using these crops to build up or break in a new garden soil, you must apply lime and fertilizer for their use or the growth will be very disappointing. I suggest at least half the application recommended for feeding the vegetable garden; that is, twenty pounds of limestone and twenty pounds of a 5–8–7 fertilizer per thousand square feet. When planting the crops in the established vegetable garden, little extra food should be necessary.

The organic matter added to the soil by a two and a half-foot crop of an acre of buckwheat is equivalent to that in two cords of manure. An acre of fully grown soy beans will return to the soil about as much organic matter and plant food as is contained in six cords of manure. From this you can figure out

for yourself whether or not it will pay you to bother with a green-manure crop. I do not mean to imply that such a crop is not a good thing, but I do want to emphasize the fact that the actual amount of organic matter added to the soil is comparatively small.

As the seed is usually sown during dry hot weather it is important to cover it with soil after planting. This can best be done by a vigorous scratching with an iron rake. This will also prevent the pigeons and other birds from picking up much of the seed.

Amount of Seed	*Per 100 Sq. Ft.*	*Per 1000 Sq. Ft.*	*Per Acre*
Buckwheat.....	½ pound	4 pounds	75 pounds
Millet.....	¼ pound	2 pounds	40 pounds
Winter rye.....	½ pound	5 pounds	100 pounds
Soy beans.....	1 pound	7 pounds	120 pounds

Green-manure crops should be turned under (1) when in blossom or (2) when the garden area is wanted for planting. Of course, the plant materials remaining in your garden after a crop is harvested make a satisfactory green manure. They can be turned into the soil or added to the compost pile. If, however, they are heavily infested with some pest, it is best to burn them at once.

Organic Fertilizers. Organic fertilizers, other than barnyard manures, are not used in sufficient quantities to add any appreciable amount of organic matter to the garden soil. Bone meal, cottonseed meal, dried manures, and similar fertilizing materials are commonly used on home gardens because of their comparative safety. Used as a source of organic matter, their cost would be excessive.

Earthworms: For many years the value of earthworms to the garden soil has been a highly controversial question. Recent articles on the subject have brought the matter to the front again. I have seen gardens where the soil was alive with worms and others where there were none. Excellent crops were grown in all cases.

Fertilizer. The average gardener, whether amateur or professional, is usually much confused by the apparently conflicting recommendations for feeding plants. As there is no one best fertilizer or combination of fertilizers, even for a very particular set of conditions, conflicting statements will continue to be made and all sorts of recommendations given for the 'successful culture' of all vegetables.

If there could be any method of growing plants where one particular formula might be best, it would seem to be in the new 'gravel culture.' Yet the introductory sentence of a recent article on the subject says, 'There is not, and cannot be, any one ideal nutrient solution.' I am inclined to agree.

Most of our commonly cultivated plants are not fussy and will grow well under varying conditions, which is indeed fortunate, for few soils are in 'ideal' condition.

All plants require a number of food elements for satisfactory growth. If any one of them is lacking, the plant will not be quite normal. If any one or all are present in excessive amounts, trouble may or may not develop, depending upon a number of conditions, such as the texture of the soil and the amount of moisture present. A slight excess of food is less likely to cause trouble than a deficiency. The essential plant-food elements are carbon, hydrogen, and oxygen obtained from the air and water; nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, iron, manganese, boron, copper, chlorine, zinc, silicon, sodium, and possibly others, obtained from the soil; and the materials incorporated, such as lime, fertilizer, and organic matter.

Merely because an element is essential to growth does not mean that it must be artificially applied. Of course, soils vary somewhat in the amount of the various plant foods they contain — depending upon their origin, texture, crops grown, past treatment, and other conditions. The majority of soils satisfactory for a vegetable garden contain sufficient amounts of most of the elements, particularly those which are needed in small quantities. Much has been said recently in regard to these so-called 'minor' elements. Commercial growers are finding it necessary to apply extra boron, manganese, magnesium, and other substances. If you keep the soil reaction at pH 6.0 to 6.5 (or slightly acid) and fertilize your garden as recommended, you will probably never suffer from lack of these elements.

Nitrogen, phosphorus, potash, and calcium are the elements usually lacking. They are used in larger quantities by the plants; they are more readily leached down through the soil with excess water; and they have a greater affinity for other elements, forming insoluble compounds. Thus, when you purchase a complete fertilizer you acquire extra nitrogen, phosphorus, and potash. Calcium is furnished by the lime. Supplied in a sufficient quantity, these elements are available when the plants require them.

Most complete fertilizers are sold by analysis, such as 4–12–4 and 5–8–7. These numerals refer to the actual pounds of nitrogen, phosphorus, and potash (in that order) in the material. In other words, if you buy a hundred-pound bag of 5–8–7, you are getting five pounds of nitrogen, eight pounds of phosphorus, and seven pounds of potash. Some complete fertilizers are sold under a trade-marked name. Analyses will be found on the bag, for such information is now required by law in most states. Most complete fertilizers are largely made up of chemical materials, such as nitrate of soda, sulphate of ammonia, superphosphate, and muriate of potash. As some of these materials are concentrated salts, they will burn live plant tissue on contact, and thus make it necessary to use care when applying them. A few complete fertilizers contain up to fifty per cent of organic materials, such as ground bone, dried blood, tankage, and cottonseed meal. These are more expensive, but milder, as well as slower, in action.

For all practical purposes there is little difference between a 5–8–7, a 4–12–4, a 4–8–4, and other similar mixtures. If you supply food for your plants as I suggest, keeping a slight surplus of all elements available, there is no need to be concerned over a difference of three or four per cent in the amount of the various elements in a fertilizer.

For plants making a heavy top growth, such as asparagus, celery, and cabbage, a high nitrogen mixture, such as a 6–8–6 is often recommended. On the other hand, plants making a heavy root growth, such as potatoes and carrots, should have a high potash fertilizer like a 4–8–10 or a 5–10–10. I believe that unless you make a specialty of one type of crop or have a large area devoted to a particular crop, any of the above or similar mixtures will be satisfactory for the whole garden. In other words, I consider it unnecessary to buy 4–8–10 for your potatoes, 6–8–6 for your asparagus, and 5–8–7 for the other crops. It is less expensive and easier to buy a large quantity of one kind of fertilizer. I suggest that with manure you use a high phosphorus mixture, such as a 4–12–4 or 5–15–5, and that without manure you use a well-balanced mixture, such as 5–8–7 or 5–10–5.

Some growers have been in the habit of using one or more of the basic materials, such as sulphate of ammonia, nitrate of soda, muriate of potash, and nitrate of potash, with varrying degrees of success. In small quantities these materials are not only difficult to obtain, but are very expensive. They also attract moisture and become hard if kept for any length of time. It is necessary to use special care in their application, and continued use of any one of them will sooner or later result in an abnormal soil condition. If you believe some extra nitrogen is needed to push along a crop, spread some of the regular complete fertilizer in the row. You will be supplying the nitrogen, and the extra phosphorus and potash will do no harm.

Organic fertilizers, such as bone meal, dried manures, and tankage, have always been popular with the amateur gardener because of the ease of handling and comparative freedom from burning. The plant-food content of these materials is comparatively low and also unbalanced, especially for use on the vegetable garden. Therefore it would seem wise to use them only as a supplement to a complete fertilizer. The amount of organic matter they supply is negligible. The plant food in them is comparatively expensive.

Gravel Culture. The growing of vegetables in a sterile medium, such as sand, gravel, finely crushed stone or cinders, by means of nutrient solutions is still far from practical. I can only suggest it as a hobby or for the enjoyment of a shut-in. You will find a number of good books giving complete directions.

Vitamin B_1. This much-advertised plant-root stimulant has proved to be of little or no value in the vegetable garden.

Starter Solutions. Recently there has been some publicity given to the great

increase in yield obtained from vegetable plants fed small amounts of plant food in solution. When plants, such as tomatoes, are set out, they are watered with a weak solution of fertilizer. Later, at intervals, a similar mixture is applied on the soil beside the plant. These experiments have been conducted with the idea of helping the vegetable grower who cannot afford to make heavy applications of fertilizer and those who farm a light soil where the rainfall may be light.

Those gardeners who have used liquid manure are doing this very thing. Those who desire to try it can use any of the many soluble plant foods now available on the market. In the past most of this type of material has been sold as food for house plants. Now there are a dozen complete mixtures available, in both liquid and crystal form.

Personally, I have always recommended the use of rather heavy applications of complete fertilizers for the growing of vegetables. In addition, I have suggested the free use of water or the generous use of organic matter. If this is done, there will be little need to go to the bother of using starter solutions.

Application of All Fertilizing Materials. I have not mentioned the use of any plant food in the furrow or hill because I believe that all fertilizer should be broadcast. Few gardeners realize the extensive root system of our vegetable plants. Even beets and carrots have feeding roots that extend over a foot in all directions, and roots of a good husky tomato plant will travel more than 5 feet in their search for food and moisture, so there is no particular need to place the fertilizer near the plant. Owing to limited space it is frequently necessary to keep every cubic foot supplied with sufficient amounts of plant food.

Lime

Most soils that have not been cultivated for many years will be acid in reaction. If you are starting a new garden, it might save a season of disappointment if you have your soil tested.

In an established garden, the growth of plants is the best indicator whether or not your soil needs lime. If plant growth is satisfactory, do not make any great change in cultural practices. On the other hand, if plants are not making normal growth, one of the first things to do is to determine the approximate reaction of the soil. This can be done by sending a sample to your state college or making a test yourself by the use of one of several simple soil-test kits. The use of litmus paper is not satisfactory. Beets are an excellent indicator of the reaction of your garden soil. If your beets grow vigorously and have a well-balanced root and top, your soil acidity is about right. Beets are the first crop to show either excess acidity or alkalinity. The symptoms in either case will be about the same: stunted growth, small roots, and an excess of red and yellow color in the leaves.

The reaction of the soil is measured by a scale of fourteen points, known as the pH scale. Seven is halfway, or neutral; below seven is acid, and above seven is alkaline. Most vegetables will grow best at a pH of 6.0 to 6.5, or slightly acid, and it is at this point that I suggest you try to keep the soil in your vegetable garden.

The soil is made acid because: (1) the alkalies leach out more readily than the acids; (2) every crop removes lime as it grows; (3) most chemical fertilizers are acid; (4) the decomposition of all organic matter produces acids; and (5) most soils are derived from rocks that are acid in character.

If lime is needed, the important thing is to get it on as soon as possible. Lime is comparatively harmless to growing plants, so it can be applied at any convenient time. Of course, it is best to mix it in with the soil, so fall and spring applications are usually made. Spread it evenly over the surface and cultivate it in, or turn it in when plowing or spading. It does little immediate good to spread ground limestone on the surface, as it is very slowly soluble. On the other hand, hydrated lime spread on the surface will start to act as soon as water is applied.

Hydrated lime should not be used on the compost pile, on or with manure, or mixed with a commercial fertilizer. Use ground limestone instead.

The value of lime depends upon its content of calcium and magnesium oxides as well as on its fineness. The analysis is usually printed on the bag. Unfortunately, to most salesmen, as well as to their boss, lime is lime regardless of its content or fineness. The terms 'agricultural' and 'land' lime are not standardized, and may be applied to any one of a dozen kinds of lime that might be used on the land. Hence, when you buy 'land lime' there is no way of knowing just what is in the bag, unless there is further definite printed information. There are two kinds of lime most commonly sold for agricultural purposes in most states; they are hydrated lime and ground limestone.

Hydrated lime is a fluffy, white, flourlike powder containing sixty to eighty per cent of sweetening material. It is carried off by the slightest wind and is irritating to the eyes and nose as well as exposed skin wounds; it is often used as a carrier in dusts for controlling pests, and sometimes applied alone on such plants as squash for an insect repellent. It is usually sold in fifty-pound bags which are about the same size as the hundred-pound bags of ground limestone, should cost about the same, and contain about the same sweetening value. The hydrated lime, however, is the quicker in action.

Ground limestone is a grayish, gritty, cement-like material made directly from the raw limestone rock. Its value largely depends on the fineness to which it is ground. The finer it is the more quickly it performs its job. Under ordinary conditions, it is much slower than hydrated lime before it 'gets to work.' Ground limestone may contain from twenty to fifty per cent of sweetening material.

Wood ashes contain from twenty to thirty per cent of lime and should only be used where there exists a definite need for a sweetening agent. Many gardeners make the serious mistake of applying wood ashes for the potash content to a soil already almost alkaline in its reaction. The potash content of wood ashes is very small — one to four per cent. Hence, its main value is as a sweetening agent in place of limestone or hydrated lime.

It is impossible to make definite recommendations as to the quantity of lime you need to bring your garden soil up to a pH of 6.3. It is first necessary to know the actual present reaction of the soil. It is seldom best to use more than forty pounds of hydrated lime or sixty pounds of limestone per thousand square feet at one time, no matter how acid the soil may be. If necessary, lime can be applied before and after plowing, or several light applications may be made during the season. Once the soil is up to pH 6.3, a light application (ten pounds of hydrated or twenty pounds of limestone per thousand square feet) once every three years should keep it there.

Do not guess or put lime on just because you think it is needed. Neither moss nor sorrel is a sure sign of the need for lime. In other words, there is no way of knowing just what the reaction of your soil is except by a reliable test.

Liming can easily be overdone, so use reasonable care. It is simple and inexpensive to make an acid soil sweeter, but difficult and expensive to make a vegetable soil acid, once it is alkaline. I would much prefer to have my vegetable garden soil acid than to have it even slightly alkaline.

Fertilizer Tables

PLANT FOOD CONTENT

Chemical	*Approximate number of pounds in 100-pound bag*		
	Nitrogen (N)	*Phosphorus (P_2O_5)*	*Potash (K_2O)*
Nitrate of soda	16		
Nitrate of potash	13		42
Sulphate of ammonia	21		
16 per cent Superphosphate		16	
50 per cent muriate of potash			50
Sulphate of potash			51
Organic			
Cottonseed meal	6	2½	1½
Milorganite	6	3	
Dried blood	13		
Animal tankage	8	9	
Ground bone	3	23	
Precipitated bone		38	
Mixed fertilizers			
5–8–7	5	8	7
4–12–4	4	12	4
4–8–10	4	8	10
Loma	5	10	4
Vigoro	4	12	4
Dry manures			
Sheep	2	1½	3
Cattle	2	2	2
Poultry	5	2½	1
Wood ashes			1 to 4

Lime or Fertilizer

AMOUNT TO APPLY

(in pounds)

	100 sq. ft.	*500 sq. ft.*	*1000 sq. ft.*	*Acre*
Standard application	5	25	50	2000
Medium application	2½	12½	25	1000
Light application	1¼	6	12½	500

APPENDIX B

General Information on the Control of Insects and Diseases

Insects

Insects attain their tremendous destructive possibilities through either their rapidity of multiplication or their voracious appetites. For example, plant lice or aphids double their number every few hours, while cabbage worms have such an appetite that they consume their weight in leaves every twenty-four hours.

Types of Insects. If you have studied the control of garden insects, you have undoubtedly noticed the emphasis placed upon the manner in which an insect obtains its food. This has been an important factor in the successful control of insect pests in the past, because almost without exception a stomach poison was necessary to kill chewing insects and a contact poison was used for sucking insects. Many amateurs have consistently tried a stomach poison, such as lead arsenate, to kill sucking insects, such as plant lice, and have wondered why the treatment failed. With the development of an insecticide that kills both types of insects equally well, it is no longer necessary to determine just how an insect feeds in order to effect its control.

Rotenone, the ideal insecticide. During the past few years an old insecticide has been improved to the point where it is effective as well as economical. It kills both sucking and chewing insects, yet is harmless to birds, animals, and people. The active elment in this material is known as rotenone, and it is now easily obtainable for use in both sprays and dusts wherever garden supplies are sold.

This effective insecticide is made from the pulverized roots of woody plants, such as derris, timbo, and cube, found in southern Asia and in South America. The active ingredients of these roots, which include a number of poisons in addition to rotenone, were originally known as fish poisons and have been used by the natives for years. By pounding the roots in a small quantity of water, a milky solution was produced which, poured into a pond, brought the fish to the surface in a paralyzed condition. The Indians ate the fish with no ill effects, and it was thus discovered that rotenone was deadly poisonous to cold-blooded animals (insects and fish), but relatively harmless to warm-blooded animals (birds, dogs, people).

As in the case of the fish, the action of the rotenone is somewhat slow, paralyzing the insect at first, then gradually killing it after a few hours. Young, immature insects are easily killed by rotenone, whereas the fully grown ones will merely be paralyzed for a time. Therefore, it is doubly important to use this material before the insects are fully grown.

Formerly very unstable, and therefore unreliable, improved methods of manufacture and mixing have now placed an ideal insecticide in the hands of the vegetable gardener. Here is a material you can use on your cabbage or cauliflower heads when they are almost ready to harvest. Rotenone is usually sold under a trade or brand name, and is also obtainable combined with a fungicide (sulphur or copper) to make an all-purpose garden dust or spray. Directions for the proper use of these various materials will be found on the package, and they should be followed carefully. The maker has done a great deal of experimental work to determine the correct dilution and procedure for you to follow in order to get the best results with his particular material.

Rotenone, however, does have some drawbacks. It gradually loses its killing power and therefore must be reasonably fresh to be effective. It should be purchased from a dealer who handles a considerable quantity, for it loses its strength on his shelves just as much as it does on yours. Do not attempt to save money by using the rotenone you may have left over from last year. It also loses its effectiveness three to four days after it is applied to the plant. This means that more frequent applications must be made. This is an advantage, however, for it is only by frequent attention that you are able to get the best of your garden insects. I make it a practice to take my duster into the garden twice a week during the bug season, from May 1 to July 15, and once a week from July 15 to September 15, in the late evening or early morning when the air is quiet and heavy. I apply a light but complete covering of rotenone dust on all the crops I suspect of harboring insects, paying particular attention to:

Peas: May and June for aphids in the growing point.

Beans: late June, July, and August for Mexican bean beetle.

Tomatoes: June for potato flea beetle and aphids.

All members of the cabbage family: late June until frost for cabbage worm and aphids.

All vine crops: June and July for striped cucumber beetle, squash bug, aphids, and squash vine borer.

It is a good plan to begin blowing the dust around the plants even before there is an insect in sight.

Buy sufficient dust to carry you through for a month or two. The size of your garden and the crops you grow will determine the amount. I suggest you start off with ten pounds unless your garden is very small. Be sure to get some more before the first supply is entirely used up. The bugs are always most plentiful when the poison is gone.

Rotenone is also useful for controlling insects on flowers. If you prefer, you can use a sprayer for applying it. A concentrated wettable rotenone powder or liquid rotenone can be purchased for this purpose.

Pyrethrum is another non-poisonous insecticide that is commonly available

alone or combined with rotenone and sold under various trade names. It has proved slightly more effective for controlling worms and most sucking insects; rotenone is somewhat better for controlling beetles. Pyrethrum is made from the dried flowers of that name. It is similar to rotenone in many of its characteristics. It has been used for many years, but has never become popular because of its comparatively high price. Rotenone is more commonly used at present.

Other Insecticides for Your Medicine Chest. Paris green is a deadly poison, but still the most satisfactory material for controlling cutworms, grasshoppers, crickets, and sow bugs. Buy a pound and keep it in a place where children will not be able to get at it. It will keep indefinitely.

Corrosive sublimate is another deadly poison. It is used for the control of maggots on cabbage, cauliflower, and broccoli. Buy a bottle of tablets and keep it alongside the Paris green. It will also keep indefinitely.

If you are unable to obtain rotenone, you will have to depend on the following old standard remedies:

Lead arsenate is a deadly poison that has been used for many years to kill leaf-eating insects. It is even now universally sold for that purpose because it is still the least expensive and most effective remedy. Buy four pounds and keep it with the other poisons. Although it keeps indefinitely, it does cake and become unfit for dusting, so it is not advisable to buy very much at one time unless you have a dry place to store it. For use as a dust it can be applied full strength just as it comes, or, if you desire to economize, it can be mixed with hydrated lime, gypsum, talc, or clay at the rate of one pound of the lead arsenate to five pounds of the carrier. For a spray mix half an ounce (two and one-fourth tablespoonfuls) of the lead arsenate powder in a gallon of water, or one pound to twenty-five gallons. You can also purchase lead arsenate combined with copper and lime for use as a dust or combined with Bordeaux for use as a spray. These are for the control of both chewing insects and fungous diseases. *Calcium arsenate* can be substituted for lead arsenate, if desired.

Forty per cent nicotine sulphate is the most effective and inexpensive insecticide for controlling sucking insects, such as aphids, leaf-hoppers, and white flies. Buy an eight-ounce bottle. The liquid loses strength after the bottle is opened, so buy only enough to last one season. It is used at the rate of two teaspoonfuls to a gallon of water, or the whole eight ounces to twenty-five gallons. Always use soap with nicotine sulphate; it greatly increases its effectiveness. To each gallon of spray solution add one tablespoonful of high-quality soap flakes or two tablespoonfuls of regular horticultural spray soap. Forty per cent nicotine sulphate can be combined with either Bordeaux or arsenate of lead. All three make an all-purpose spray for controlling sucking and chewing insects and fungous diseases.

Tobacco dust has been frequently sold to control sucking insects. Because of its instability it is not to be recommended.

Diseases

Fortunately, the average back-yard garden does not suffer much damage from disease. In the twenty-five years I have gardened, the vine crops and potatoes have been the only vegetables seriously damaged by disease in my gardens in three different localities.

Insects are visible to the naked eye and their presence is definite evidence. Fungi and bacteria, on the other hand, are microscopic, and only when they become well established within or upon the plant does their presence become apparent. By this time serious damage may already have been caused and it may be too late to do much about it. As in the case of insect attack, certain diseases, such as celery blight and potato blight, can be anticipated and serious damage averted by the 'ounce of prevention.' A few diseases may appear on your vegetables for which there is no practical control. Little can be done about such diseases as bean blight, black rot of cabbage, cucumber blight, tomato wilt, and bottom rot of lettuce.

Keep your plants vigorous and healthy by proper cultivation and it may be that you will never be troubled by most of the diseases described here. Proper feeding and watering will influence the health of plants as of animals.

Control of Diseases. 1. Rotation of crops is usually mentioned as one of the most important practices in the control of vegetable diseases. By changing the location of the crops in a garden from year to year, there is less likelihood of certain diseases becoming established, particularly those that live over in the soil. This practice cannot very well be followed in a small garden. If you carry out my suggestions for a number of sowings of most of the vegetables for a continuous supply, some crops will have been planted in several sections of the garden. In this way the only crops you can rotate are those occupying a certain section of the garden most of the season. For example, the tomatoes should be planted in a different place each year.

2. Clean up and dispose of the remains of diseased plant. It is rather foolish to pull up and throw a diseased plant over other plants to the edge of the garden, spreading the disease spores (seeds) along the way. Nor should a diseased plant be left in or near a garden where insects might feed on it and transmit the trouble to healthy plants. This applies particularly to bacterial diseases, such as cucumber wilt, and to mosaic diseases, such as aster yellows on lettuce.

A number of weeds are important factors in wintering over disease organisms and insect pests. You can do much to help keep your vegetables free from these pests by carefully cleaning up in and around your garden in the fall. The planting of a cover crop, such as winter rye, as soon as a row or section of the garden

is clear will add organic matter to the soil, improve the appearance of the garden during the long winter months, hold much of the available plant food left in the garden soil, and reduce trouble from insects and diseases.

3. The control of insects is very important in the control of diseases in the vegetable garden. Insects spread some diseases directly. They weaken a plant, making it more susceptible to disease, and also, by breaking the protective tissue, expose it to attack by harmful organisms.

4. When such soil-borne diseases as clubfoot of cabbage or potato scab become serious in a small garden, it may be best to stop growing these plants entirely for three or four years.

5. Seed treatment to control vegetable diseases has become a common practice. A few seedsmen now treat all the seed they sell according to recommendations from research workers. Other seedsmen will treat some of their seeds on request. Detailed directions will be found in Chapter IX.

6. Soil sterilization is not practical as yet for the outdoor garden. Materials, such as formaldehyde, steam, and tear gas, are available, but not only is the cost prohibitive, but recontamination may immediately take place. In the greenhouse hot-bed and frame, the sterilization of the soil is the only way to be sure of freedom from many common troubles. Treatment is not only practical, but imperative. Directions are given in Chapter IX.

7. Resistant varieties of several vegetables are now listed by most seedsmen, and more will be available each year as they are perfected. Unable to control some exceptionally widespread and serious diseases, research workers in many states are working to develop strains which are resistant. We already have Washington rust-resistant asparagus, many varieties of yellows-resistant cabbage, and mildew-resistant melons. There are a number of others about ready to be placed on the market. It is important to bear in mind that these vegetables have been bred for resistance to a specific disease. Often this disease is particularly prevalent in a limited area. The variety may even be inferior to other standard varieties for growing in your garden. You can easily find out by writing to your state college.

8. Many fungous diseases can be controlled or prevented by spraying or dusting with a material poisonous to the fungus, but harmless to the plant. The proper use of fungicides is, of course, as a preventive rather than as a curative measure. Timeliness and thoroughness are important factors in the control of both diseases and insects.

Fungicides. Bordeaux mixture has long been the standard fungicide for the control of vegetable diseases. The usual formula is 4–4–50, and it is made up of four pounds of copper sulphate, four pounds of lime, and fifty gallons of water. It is commonly sold already mixed in both the powder and the paste form. Freshly made material, however, is much more effective and not too difficult to make up

on the spot if you can get powdered copper sulphate and hydrated lime (one of the best kinds of garden lime). Dissolve one-fourth pound (eight level tablespoonfuls) of powdered copper sulphate in three gallons of water, stir in one-fourth pound (eighteen level tablespoonfuls) of hydrated lime, and use immediately. If you purchase the material readymade, follow the directions on the package. For young tender plants — cucumber, melon, and tomato — use a 2–2–50, or half-strength, Bordeaux.

Lead arsenate and nicotine sulphate can be mixed with Bordeaux for controlling both types of insects as well as fungous diseases. This can be used on potatoes to control aphids, leaf-hopper, flea beetle, potato bug, and potato blight. The formula for a small quantity is:

Powdered copper sulphate	¼ pound or 8 tablespoonfuls
Hydrated lime	¼ pound or 18 tablespoonfuls
Lead arsenate	⅛ pound or 10 tablespoonfuls
Nicotine sulphate	1 ounce or 2 tablespoonfuls
Water	3 gallons

This is still the standard spray wherever white potatoes are grown. If there are no aphids, you can omit the nicotine, and, after the bug season, you can omit the lead arsenate. But do not fail to keep the potato vines protected by frequent applications of the Bordeaux.

At times, aphids, flea beetle, or potato bugs (once in a while, all three) will attack the eggplant and tomato plants soon after they are set out. If so, two or three applications of this same mixture will control them, but all the ingredients except the water must be half-strength because of danger from injury.

Bordeaux is rather harsh to use on the tender leaves of some vegetables, such as tomatoes, cucumbers, and melons. It also leaves an undesirable residue. It has been used for years because no better remedy was found. Recently a number of proprietary copper mixtures, known as *neutral fixed coppers*, have been placed on the market for use on the tender crops. These materials are sold under trade names and should be obtainable from your local dealer. I believe that they will soon supplant Bordeaux for control of plant diseases. Growers are already starting to use them in quantity, even on celery and potatoes. Follow the recommendations on the package. Most of the manufacturers have various mixtures with rotenone or lead arsenate made up for use in the control of specific pests, using neutral copper as one of the ingredients.

Copper-lime dust is really a Bordeaux dust, but should not be confused with the Bordeaux powder or dry Bordeaux which is used to make up the standard Bordeaux spray. It is usually made of twenty pounds of mono-hydrated copper sulphate and eighty pounds of hydrated lime. It is used by those who prefer dusting to spraying, and can be used in the control of those diseases for which

Bordeaux mixture is the recommended remedy. Copper-lime dust can also be obtained with lead arsenate for use as a combination fungicide-insecticide.

Sulphur. This fungicide is definitely injurious to the leaves and fruits of many vegetables, so its use is not to be recommended in the vegetable garden.

Corrosive sublimate is often recommended as a disinfectant for surface diseases of the potato — scab and rhizoctonia. Soaking the seed potatoes before cutting for one and a half hours in the standard 1 to 1000 strength (one tablet to a pint of water or one ounce to seven and a half gallons of water) will kill the fungus. Corrosive sublimate is also recommended as a disinfectant for killing diseases carried on the surface of certain vegetable seeds. The recent introduction of organic mercury compounds for the control of the same diseases in a safer, quicker, and easier way has practically done away with the necessity of using the corrosive sublimate.

Formaldehyde is used for sterilizing seed beds and plant beds as well as treating potato seed. As its main use today is in the growing of plants, you will find detailed directions in Chapter IX.

Semesan, red copper oxide, zinc oxide, and other dusts are used in treating vegetable seeds for protection against damping-off and other soil-borne diseases. (See Chapter IX.) If you experience trouble from seed rotting in your garden, you will find that the proper treatment of the seed will make a great difference. You should have little trouble unless your garden soil is exceptionally heavy or damp, in which case treat as recommended.

Dusting versus Spraying. There has always been considerable controversy over the best way to apply fungicides and insecticide. The question is still far from settled, for it is still frequently asked by professional as well as amateur gardeners.

Advantages of dusting:

1. Equipment and material are much lighter; therefore easier to use.
2. Much quicker to apply; a row can be dusted in about half the time it would take to spray it.
3. No measuring; therefore no need for small equipment that is easily mislaid — spoons, cups, funnels, and so on.
4. No nozzles to clog, no water to carry, no pressure tank to leak.

Advantages of spraying:

1. Liquid sprays cover more completely and evenly; therefore control of both insects and diseases should be better.
2. Spray can be applied on windy days.
3. Actual cost of materials is less.

Equipment. In my twenty-five years of experience, I have worn out a number of sprayers and dusters. In addition to those I have used myself, I have had a chance to see in operation most of the sprayers and dusters offered for sale.

Because I believe it is more satisfactory for the amateur, I am recommending that you get a good duster and use it frequently. The large grower who can afford a power machine should spray. Excellent small wheelbarrow sprayers with fifteen-gallon tank and gasoline engine are now available for less than one hundred dollars.

There are many kinds and sizes of sprayers and dusters now available. For the small garden, I recommend a two-quart plunger spot duster that will cost from two to four dollars, or a three-gallon compressed-air sprayer that will cost from three to eight dollars. With proper care these should last from two to five years. Do not attempt to save money by purchasing cheap spraying or dusting equipment.

Pests Common to a Number of Vegetable Crops

Insects

Ants seldom do any direct damage to vegetable plants. Indirectly, they sometimes cause a great deal of trouble. By making their galleries around and under the plants, they aerate and dry out the soil, causing the death of seedlings and damaging older plants. They also colonize and protect both the common leaf aphids and the less common root aphids. Ants are most troublesome in a rather poor soil, particularly one that is sandy. Improving soil conditions by the addition of organic matter and frequent cultivation will do much toward discouraging these pests. Where there are a limited number of hills or nests, they can be fumigated by making a hole six inches deep in each hill with the wooden end of the hoe and pouring in a tablespoonful of carbon disulphide or cyanogas. The hole is then refilled and the surface sprinkled with water to hold the gas in. Various poisons can be purchased or made up which will attract and kill the ants. Those materials in which thallium sulphate is the active ingredient are to be especially recommended.

Aphids or plant lice are common pests in the vegetable garden. At times they will be found on every crop. These small, soft-bodied insects come in all colors of the rainbow and double in number every few hours. Usually they will be found on the tenderest part of the plant, the growing tip, but this is not always so, as they swarm all over the old cabbage leaves just as well. Some crops, such as peas, will be attacked four years out of five, whereas beans are seldom bothered. The first sign of the presence of aphids is the curling of the leaves. They are easy to kill, provided you can hit them with the insecticide. This is seldom possible, as they burrow into the unfolding tip and are also protected by the tightly curled leaves. For this reason one application will rarely get all of them and it is important to follow up another in a few days. Rotenone, pyrethrum, nicotine and soap, and other contact insecticides can be used. Fortunately, aphids are extremely sensitive to weather conditions and have a number of natural enemies.

Blister beetles are common garden pests and are often destructive to beans, peas, potatoes, and beets. They are a half-inch long, slender, somewhat soft-bodied, black or black-and-gray-striped insects that appear suddenly in large numbers. Dust infested plants thoroughly every day with rotenone.

Cutworms. This pest attacks most of the vegetable crops. There are a number of species commonly found over a period from mid-April to late June. Some cut the plant off at the surface of the ground, others climb the plants and eat the leaves. The cutworms are smooth gray or brownish caterpillars which conceal themselves during the day underground or in rubbish near the plants and emerge at evening to feed. They are particularly active on a warm evening, which, therefore, is the best time to apply the poison bait. The fully grown cutworm burrows into the soil in the summer and changes to a pupa, from which a grayish moth emerges in the late summer. The moths lay eggs on grasses or weeds. The eggs soon hatch and the young worms feed on any near-by plants till nearly fully grown. In late fall they bury themselves deep in the ground for the winter. In the spring they emerge and attack near-by tender plants, and are often attracted some distance to freshly disturbed or cultivated soil. Cutworms do not come in barnyard manure.

In my own garden, I used to wait for a few plants to be cut before I took precautionary measures. Two or three years out of five I would not lose a plant. But as it is too late to do anything after a dozen plants have been cut, I now plan to broadcast some Paris green-bran mash twice each spring — just before the cabbage plants are set out and again before setting out the tomato plants. If it is broadcast lightly and evenly, there is no reason to be alarmed about small pets or birds being attracted to it. The following is the standard poison bait for army worms, grasshoppers, crickets, and cutworms:

Bran	1 peck	*or*	1 quart
Paris green	¼ pound		1 heaping teaspoonful
Molasses	1 pint		½ cup
Water	About 3 quarts		About 1½ pints

Mix the bran and Paris green thoroughly. Dissolve the molasses in a little warm water first, then add the remainder of water. Add sweetened water to the poisoned bran until it is crumbly wet, not soggy. Let the mixture set a few minutes and broadcast it along rows of sprouting seeds or around plants. The best time to do this is just after dusk on a warm evening when there is no prospect of rain. A peck should take care of about a thousand square feet, or a garden about twenty by fifty feet. As a protective measure, many people use pasteboard collars around young plants.

Flea beetles are hard, round, shiny black, jumping insects about one-sixteenth inch in diameter. They eat small holes in the leaves. Attacking small plants,

they quickly ruin them. Even a good-sized tomato or eggplant will look sick in a few days if unprotected from these minute pests. Any copper spray or dust repels them; lead arsenate or rotenone will kill them. It is important to get there first with some protective material, for the flea beetles not only injure the leaves severely, but provide a point of entry for fungous diseases. There are several kinds of flea beetles, each of which attacks several kinds of plants.

Grasshoppers and *crickets* at times become a problem in the vegetable garden. You have to watch carefully in order to catch them feeding. The cutworm bait is the best method of control, though a thorough dusting of rotenone may discourage them.

Grubs. White grubs almost an inch long are the larvae of the common May beetle or 'June bug.' They feed on the roots of a number of plants and are often injurious to corn and potatoes. Smaller grubs are the larvae of the Japanese beetle. There is no practical control.

Wireworms are the larvae of click beetles — long, narrow, dark brown beetles which snap themselves up into the air when placed on their backs. The worms are thin, hard-shelled, brownish larvae burrowing into most of the vegetable root crops and at times causing considerable damage. There is no practical control.

Diseases

Damping-off. Frequently seed sown quite thickly will come up very poorly, and we condemn the seedsman for selling us poor seed. In many cases the poor germination has been caused by one or more of the several fungous organisms commonly known as *damping-off.* At other times the disease will attack seedlings, causing the stem to wither and rot near the surface of the soil until the apparently healthy plant falls over and quickly dies. This disease is a very serious trouble commonly experienced in the raising of early plants. (See Chapter IX.) It is also common in the garden, but only during wet spells or on damp soil. If you have experienced this trouble or have a heavy moist soil, you should treat all of the vegetable seeds before you plant them. (See table and directions for treatment on page 126.)

Mosaic diseases are becoming more common and serious in vegetable gardens everywhere. The trouble is caused by a virus — something in the juice of the plant that causes various symptoms and can often be spread by insects. As the name implies, the usual symptom is a yellow-and-green mottling on the leaves, making a sort of 'mosaic' pattern. Other symptoms are a dwarfing or stunting of a part or the whole of the plant; a crinkling or puckering of the leaves, with or without distortion or malformation; production of a large number of spindly leaves and shoots tending to grow upright; and a yellowing of the foliage.

There is no practical control. Pull out and carefully dispose of affected plants.

Keep down insects that might spread the disease. Clean up near-by weeds and other plants that might carry the trouble over the winter.

Dilution Tables

(Approximate)

Dry powders

Lead arsenate Calcium arsenate Bordeaux powder	1 pound	to 50 gallons = 4	teaspoonfuls to 1 gallon
	1½ pounds	to 50 gallons = 2	tablespoonfuls to 1 gallon
	2 pounds	to 50 gallons = 2½	tablespoonfuls to 1 gallon
	4 pounds	to 50 gallons = 5	tablespoonfuls to 1 gallon

Homemade Bordeaux

	Powdered or Crystal Copper Sulphate	*Hydrated Lime*	*Gallons Water*
Bordeaux mixture: 2–2–50 (½ strength)	2 pounds	2 pounds	50
	2 ounces	2 ounces	3
	1⅓ tablespoons	3 tablespoons	1
4–4–50 (standard strength)	4 pounds	4 pounds	50
	¼ pound	¼ pound	3
	2⅔ tablespoons	6 tablespoons	1

All-Liquid Materials for Spraying

	1–100	1–200	1–400	1–800
1 gallon	2½ tablespoons	5 teaspoons	2½ teaspoons	1 ¼ teaspoons
3 gallons	7½ tablespoons	4 tablespoons	2 tablespoons	1 tablespoon
5 gallons	¾ cup	6 tablespoons	3 tablespoons	1½ tablespoons
10 gallons	1½ cups	¾ cup	6 tablespoons	3 tablespoons
25 gallons	1 quart	1 pint	1 cup	½ cup

Manufacturers of some insecticides and fungicides recommend the use of spreading and sticking materials with their products. There has been a decided improvement in these materials, and a number of them are now available at stores specializing in the sale of spray ingredients. Many mixtures come ready to use, with the spreader or sticker combined with the poisonous material.

APPENDIX C

Sources of Information and Assistance on Your Garden Problems

There are a number of sources of information and help in the solution of problems on the growing of plants. The horticultural department of your state college or university is usually the best place to seek assistance. If possible, visit the department during Farm and Home Week or on Garden Day. Become acquainted with the instructors and the type of work they are doing. Possibly there are experiments or trials under way that will be of particular interest to you. If unable to visit them, write your questions and if some member of the staff cannot answer them, you will be directed to a source of information. Often these departments have circulars and bulletins on horticultural subjects available free of charge. Most colleges are willing to send printed material and answer questions free of charge even if you live in another state.

List of State Colleges

School of Agriculture and Home Economics, Auburn, Alabama
College of Agriculture, Tuscon, Arizona
College of Agriculture, Fayetteville, Arkansas
College of Agriculture, Berkeley, California
College of Agriculture, Fort Collins, Colorado
University of Connecticut, Storrs, Connecticut
School of Agriculture, Newark, Delaware
College of Agriculture, Gainesville, Florida
College of Agriculture, Athens, Georgia
College of Agriculture, Moscow, Idaho
College of Agriculture, Urbana, Illinois
School of Agriculture and Home Economics, La Fayette, Indiana
Iowa State College, Ames, Iowa
Kansas State College, Manhattan, Kansas
College of Agriculture, Lexington, Kentucky
Louisiana State University, Baton Rouge, Louisiana
College of Agriculture, Orono, Maine
College of Agriculture, College Park, Maryland
Massachusetts State College, Amherst, Massachusetts
College of Agriculture, East Lansing, Michigan
Department of Agriculture, University Farm, St. Paul, Minnesota
Mississippi State College, State College, Mississippi
College of Agriculture, Columbia, Missouri

Montana State College, Bozeman, Montana
College of Agriculture, Lincoln, Nebraska
College of Agriculture, Reno, Nevada
College of Agriculture, Durham, New Hampshire
State College of Agriculture, New Brunswick, New Jersey
New Mexico College of Agriculture, State College, New Mexico
New York State College of Agriculture, Ithaca, New York
North Carolina State College of Agriculture, Raleigh, North Carolina
North Dakota Agricultural College, Fargo, North Dakota
College of Agriculture, Columbus, Ohio
Oklahoma Agricultural College, Stillwater, Oklahoma
Oregon State Agricultural College, Corvallis, Oregon
School of Agriculture, State College, Pennsylvania
School of Agriculture, Kingston, Rhode Island
Clemson Agricultural College, Clemson, South Carolina
South Dakota State College of Agriculture, Brookings, South Dakota
College of Agriculture, Knoxville, Tennessee
Agricultural College, College Station, Texas
Utah State Agricultural College, Logan, Utah
College of Agriculture, Burlington, Vermont
Virginia Agricultural College, Blacksburg, Virginia
State College of Washington, Pullman, Washington
College of Agriculture, Morgantown, West Virginia
College of Agriculture, Madison, Wisconsin
College of Agriculture, Laramie, Wyoming

State experiment stations are usually located at or near-by the state colleges or universities. At many of these stations experiments and trials are conducted which should be of particular interest to gardeners. Some stations and colleges are noted for their work along certain lines: Connecticut has extensive dahlia and vegetable trials at Storrs; New York is carrying on a large amount of breeding work in fruits at Geneva; Penn State has its large annual flower and vegetable variety trials at State College; and Massachusetts has an herb garden, a large perennial garden, and vegetable variety trials at the Field Station in Waltham.

The extension service with headquarters at the state college and a branch in most counties is another possible source of help and information. The county agents are available for advice on gardening, the home demonstration agents have the latest information on cooking, and the 4–H Club agents have a great deal of material on gardening for boys and girls.

The United States Department of Agriculture at Washington has a large staff

engaged in work in all branches of agriculture. It also has published quantities of bulletins and circulars that are available for a small fee by writing to the Superintendent of Documents, Washington, D.C. (and sometimes free of charge from your state extension service or college). Much of the material, particularly that relating to the growing of plants, is rather general in its details, as it is written for the country as a whole. I believe it is much better to get in touch with your state authorities first, for they are better acquainted with local conditions.

When writing to Washington, address your inquiries to:

Office of Information
United States Department of Agriculture
Washington, D.C.

The state departments of agriculture located in the various state capitols are usually poor sources of garden information.

How about joining your local garden club and the nearest horticultural society? In these your specific problems are receiving more detailed attention.

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THE TWENTY-MINUTE-A-DAY GARDEN

BY ALBERT C. BURRAGE

PUBLISHER'S NOTE

The result of many years' experimentation, the garden described in the following pages should serve as a valuable model to the beginner and challenge to the expert. Compact and efficient, it is specifically designed to save time and space. From this garden, twenty-five by fifty feet, Mr. Burrage supplies his family of four with vegetables from June through October. By means of progressive photographs, charts, and detailed directions, he tells exactly how he does it. Mr. Burrage's description of his garden makes the perfect complement to Mr. Dempsey's already standard work.

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PART

I

REPORT ON THE 1942 GARDEN

Prove All Things
Hold Fast That Which Is Good

THE TWENTY-MINUTE-A-DAY GARDEN

The garden described herein, twenty-five by fifty feet, was taken care of by a skillful gardener in thirty minutes a day during April, May, and June and in less than fifteen minutes a day during July, August, September, and October, or an average of twenty minutes per day. This does not include the time of picking the vegetables. A novice will take perhaps fifty per cent longer.

The garden twenty-five by fifty feet will provide fresh vegetables for four people.

The information given is merely a report on a specific garden — what actually was done and what was accomplished. It does not purport to be a new discovery or a new kind of gardening. However, the garden is efficient and it does work. Suggestions are made for improving the garden, and tables are included for making a complete detailed record of your own garden.

The garden described is located in Ipswich, Massachusetts, about thirty miles north of Boston, and about three miles from the sea so that it is favored with an excellent climate. The frost leaves the ground during March and the first frost arrives about October 7. The dates given are all those used in Ipswich. For other parts of the country, there would have to be an adjustment based on comparative conditions.

In 1942, a year of normal rainfall, no artificial watering was used.

The total footage of the rows grown in this garden, owing to its design, is very much greater than the footage of the rows grown in the usual home garden of the same area, hence the unusual yield.

PART

I

REPORT ON THE
1942 GARDEN

THE PURPOSE OF THE GARDEN

The two really important reasons for having a garden are:

1. There probably will be a shortage of vegetables while the war is on, beginning in the spring or summer of 1943, and a supply of your own may be of the greatest importance.

2. Vegetables of the quality raised in a home garden cannot be obtained in the market. Peas and corn picked at their peak are entirely different in quality from those sold in markets, which are usually at least thirty-six hours old and which are not picked at their peak to start with.

The purpose of the writer was to have a small vegetable garden suitable for a back-yard, and yet big enough to supply four people and to grow the maximum quantity of vegetables with the minimum amount of expense and water and with labor of a skillful gardener limited to an average through the season of twenty minutes per day. This is accomplished by the design of the garden, by conservation of moisture, and by the selection of the most suitable varieties of vegetables for this design. A novice at gardening can use this garden plan just as easily as any other plan, but will naturally require more time than a skillful gardener. The work that the latter can do per hour is fairly definite, and therefore was used as a means of measuring the time required.

The information given herewith is based on actual experience during the summer of 1942 and is an actual garden diary. The yields as given are exact. The reported amounts are given in pounds, heads, and bunches, just as you would buy them. This statement shows what the garden actually did.

There was, however, an actual deficiency in fertilizer and manure. With the manure and fertilizer used as suggested, even greater yields

can be assured. No hand watering was done, as it was desired to see how the garden would do with only rain as the source for water. The rainfall in 1942 was exactly normal. It therefore has been found that excellent results can be obtained in at least normal years without hand watering. It is believed, however, that if a little hand watering were done by hose and sprinkler, even better results could be obtained. Based on the experience of this and similar gardens, it is believed that the predicted yields can be relied upon provided the gardening plans are followed out.

The purpose of reporting the exact figures as to the hours of work required each day, the cost, yield, and value of the crop is to enable the would-be gardener to decide if he has the requisite time, etc., available to produce a given quantity and value of vegetables.

The Design of the Garden. This garden was laid out east and west, and directions run accordingly. It could have been laid out equally well in any other direction. The design utilized the following points:

1. The vegetables are planted close together; that is, about one half the usual distance apart.

2. Corn and peas are planted over the entire garden area, but in such a way as to allow the other vegetables to grow between them. This is done by planting the corn in hills with prior and follow crops in the same row; by planting dwarf peas which will fall on the ground before they are fully grown, and by planting Limas and tomatoes, which are very tall plants, in the pea row. Before the peas are harvested, follow crops are planted six inches to one side of the rows.

3. The tall-growing tomatoes, widely spaced on poles, are grown with only one main stem, which is kept free of fruit and leaves for the lower twenty inches, to prevent shading of other crops.

4. The tall-growing Limas are widely spaced in the same way.

5. The tall vegetables, being scattered, do not shade the lower-growing ones and are clear gain as regards space. Low-growing prior crops are grown between the corn hills and bean and tomato poles.

6. Low-growing follow crops are grown six inches to one side of the tall vegetables after the prior crops.

7. Higher-growing follow crops are grown after the peas, six inches to the side. This allows them to be planted while the peas are still growing.

8. The width of the garden is twenty-five feet. Thirteen rows are

planted in this width. While this may seem too narrow, nevertheless it is sufficient. The garden can be made wider, but no better results will be obtained and it will take more hours to care for it, about in proportion to its extra width.

9. The garden must be in full sunshine from morning to night. No matter what else is done, the garden cannot be successful without full sunshine.

Conservation of Moisture

Conservation of moisture is obtained by:

1. Planting the rows close together which shades the soil.

2. Spreading peat moss over the garden which acts as a sponge to absorb the rain and as an insulator to keep the earth cool.

3. Using dwarf peas, which fall flat on the ground and help shade the earth.

Selection of Varieties

The varieties were selected after careful comparative tests of both culinary and horticultural qualities lasting over many years. On many occasions there were three or more varieties of one vegetable tried at one meal. The best-tasting variety was chosen by voting and in most cases the decision was unanimous. Few people realize what a tremendous difference there is between the quality of the average variety of vegetable and that of the best. It is about comparable to the difference between a rainy day and a nice sunny day. No variety was selected unless the quality of taste was excellent and the horticultural qualities satisfactory.

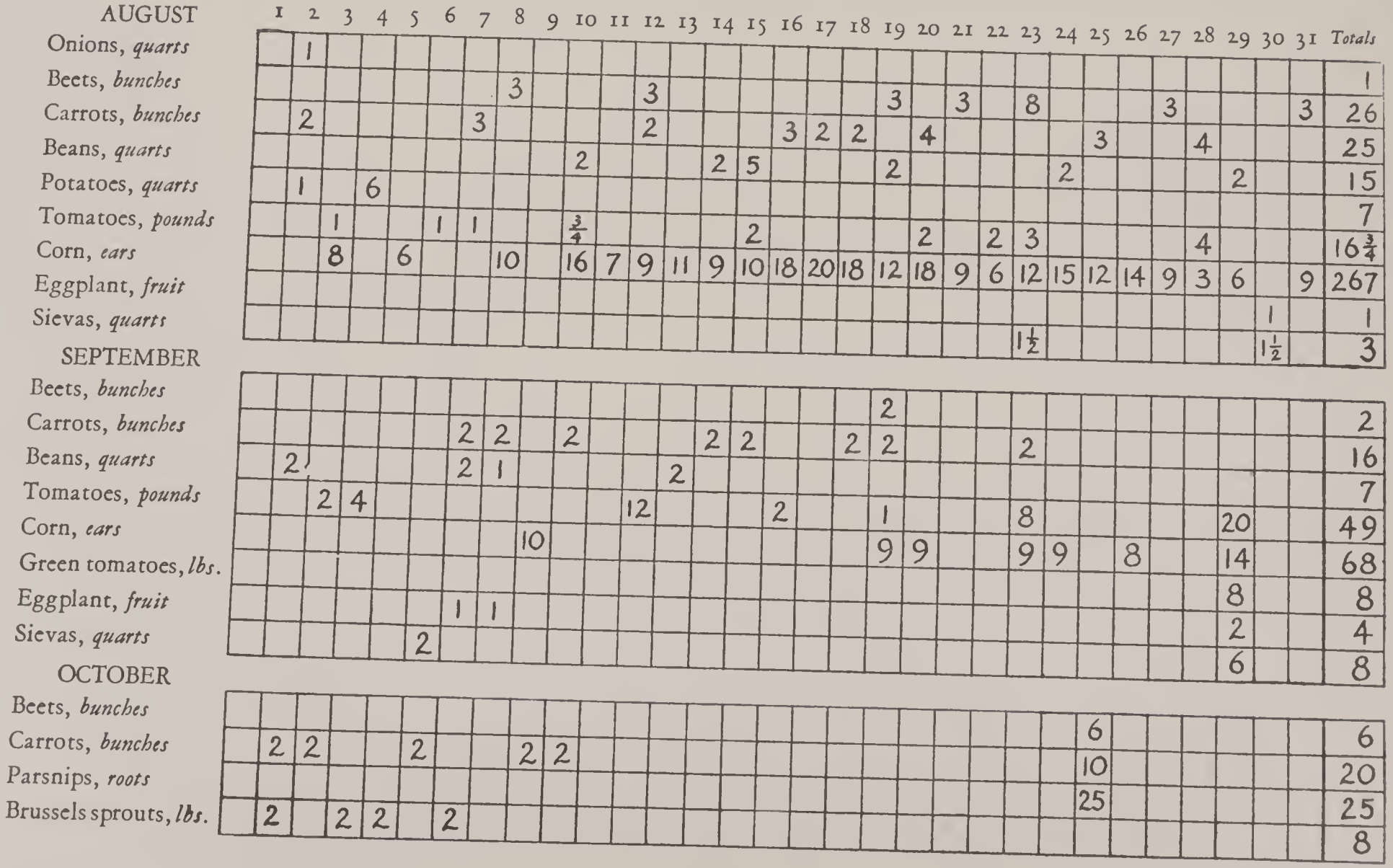
YIELDS, 1942

The yields of each vegetable are given for each time they were picked.
The yields are measured in pounds, quarts, heads, and bunches.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	*Totals*
MAY																																
Spinach, *pounds*																							2		2			2			2	8
JUNE																																
Spinach, *pounds*					2			2	1							2																7
Onions, *quarts*												1		1½			1½	1			1											6
Lettuce, *heads*																2		2	2	1	2	1	3		4	2			2			21
Beets, *bunches*																				2		2		2						2		8
Peas, *quarts*																		4				4	2	2½	6	2		16		30		66½
Beet greens, *pounds*																				1½		1½		1½						1½		6
JULY																																
Onions, *quarts*														2																		2
Beets, *bunches*				2½			2			3					3				8											4		22½
Peas, *quarts*				8	6	4																										18
Carrots, *bunches*									2				2								2		2	3	3			3	3	2		22
Beans, *quarts*								1	1				2	2	2		2		8	2	2	2	2	2	2		2	2		2		36
Potatoes, *quarts*					1½			1			1			1½		1½	1½			1		1					1	1	1½	1		14½
Tomatoes, *pounds*																			1					1				2				4
Beet greens, *pounds*				1½			1½				1½				1½				1½													7½

YIELDS, 1942

Continued



AUGUST	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Totals
Onions, *quarts*		1																														
Beets, *bunches*								3				3							3		3		8				3				3	
Carrots, *bunches*		2					3					2				3	2	2		4					3			4				
Beans, *quarts*										2				2	5				2					2				2			
Potatoes, *quarts*		1		6																												
Tomatoes, *pounds*			1			1	1			$\frac{3}{4}$					2					2		2	3					4			
Corn, *ears*			8		6			10		16	7	9	11	9	10	18	20	18	12	18	9	6	12	15	12	14	9	3	6		9	
Eggplant, *fruit*																														1		
Sievas, *quarts*																							$1\frac{1}{2}$							$1\frac{1}{2}$		

SEPTEMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Totals
Beets, *bunches*																			2													
Carrots, *bunches*							2	2		2				2	2			2	2				2										
Beans, *quarts*		2					2	1					2																			
Tomatoes, *pounds*			2	4								12				2			1				8					20			
Corn, *ears*									10										9	9			9	9		8		14				
Green tomatoes, *lbs.*																												8				
Eggplant, *fruit*							1	1																				2				
Sievas, *quarts*					2																							6				

OCTOBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Totals
Beets, *bunches*																																
Carrots, *bunches*		2	2			2			2	2															6							6
Parsnips, *roots*																									10							20
Brussels sprouts, *lbs.*		2		2	2		2																		25							25
																																8

1942 Crops — Amounts and Values

Vegetables	*No. of Hills*	*Feet of Row-Net*	*Pounds*	*Fruit Heads or Ears*	*Value per lb.*	*Total Value*
Beans		190	42		$.12	$5.04
Beets		90	64		.08	5.12
Beet greens			13		.07	.91
Brussels sprouts		25	8		.25	2.00
Carrots		90	85		.08	6.80
Eggplant		25		5	.15	.75
Limas	15		17		.15	2.55
Onion, sets		50	15		.05	.75
Parsnips		50	15		.05	.75
Peas		200	84		.12	10.00
Potatoes		50	42		.025	1.05
Spinach, Bloomsdale Savoy		90	15		.07	1.05
Tomatoes	18		78		.08	6.24
Lettuce		50		21	.15	3.15
Corn	112			335	.025	8.38
Totals	145	910	468	361		$54.54

Costs

Beans, Stringless Green Pod	3 lbs.	$ .90	
Beets, Harvard	¼ lb.	1.50	
Brussels sprouts, Catskill	1 pkt.	.50	
Carrots, Golden Beauty	½ oz.	.35	
Corn, Golden Bantam, Massachusetts grown	¾ lb.	.30	
Eggplant, Early Long Purple	1 pkt.	.15	
Lettuce, May King	1 pkt.	.15	
Lettuce, Imperial Number 44	1 pkt.	.15	
Limas, Pole, Sieva	½ lb.	.25	
Onion Sets, Japanese Yellow Globe	1 lb.	.35	
Parsnip, Hollow Crown	½ oz.	.20	
Peas, Little Marvel	4 lbs.	1.50	
Potato, Irish Cobblers	½ pk.	.40	
Spinach, Bloomsdale Savoy	2 oz.	.40	
Spinach, New Zealand	1 oz.	.20	
Tomato, Rutgers	1 pkt.	.10	$7.40
Fertilizer	50 lbs.	1.50	
Peat moss	1 bale	4.50	
Manure	½ cord	6.00	
Greentox	1 pint	2.00	
Rotenone dust	2 lbs.	.50	
Snarol	4 lbs.	.85	15.35
			22.75
Total			22.75
Plus for first year only:			
30 poles		4.00	
Plowing and disk harrowing		3.00	
Total for first year only			7.00
			$29.75

After the first year the cost of the garden will be about $22 per year.

Hours Worked 1942

OCT.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	
1		1		¼					
2		½		1					
3		¼				1			
4		½			4	1½			
5			1	1½	½				
6		1	1½						
7					1¼	1½			
8		1½	½	2					
9		1		¼	½				
10									
11						1		1	
12		1							
13		1½	1	1			2½		
14		1½		6					
15			1½						
16		2	½		¼				
17									
18				½		½			
19		1½		¾					
20		1						2	
21					1				
22			1¾		1				
23		½	1¾	1½					
24			1½		1			2	
25			1			¾			
26			1½						
27	1								
28	1								
29	1		1			½			
30							½		
31			¼						Total
	3	14¾	14¾	14¾	9½	6¾	3	5	71½

Total hours worked.....71½
Months..... 8
Average per month..... 9
Average per day (minutes)..20

This is the time actually worked by a skillful gardener. A beginner would probably take more time in performing the necessary operations and would want to spend more time tinkering.

Approximately this time was spent doing the following:

12 hours	Preparing soil
8 hours	Setting poles
15 hours	Weeding
20 hours	Planting
2 hours	Tying and pinching tomatoes
15 hours	Pulling up crops
72 hours	

THE STORY OF
THE TWENTY-MINUTE-A-DAY GARDEN
IN PHOTOGRAPHS

FROM
APRIL
THROUGH
NOVEMBER

APRIL 19 I

The curtain is just about to go up on Act I. Plowing, harrowing, manuring, and fertilizing were done about March 20, then the poles sunk in readiness for tomatoes and Limas, and the first peas planted by the 28th. All that is needed now is twenty minutes a day, skillfully applied in accordance with the accompanying charts and directions. The plot is 25 × 50 feet.

APRIL 26 II

The peas planted March 28 are well above ground, and spinach, at the left, is beginning to show. Other early plantings — beets, carrots, onions, and parsnips — have already been made. Likewise, a second planting of peas, for the summer succession. Proper spacing is important.

MAY 12

The general plan of the garden becomes apparent. All *prior* crops have now been planted, in rows about 2½ feet apart, and about half of the *main* crops, so that by the middle of May nearly half the garden has been planted. *Follow* crops go in later. Three or four spaced plantings of lettuce are recommended.

MAY 17 IV

Full sun is a requisite for strong and steady growth. Not a weed can be seen and very few will grow through the ½-inch covering of peat moss which has gradually been spread over the entire surface. Corn and peas are planted over the whole garden, but in such a way as to allow other vegetables to grow between them.

V

MAY 17

This lateral view shows how the peas are grown up to within 1 foot of the poles, leaving sufficient space for the Limas and tomatoes, for which the poles have been firmly set at least 2 feet down to prevent wobbling. For maximum results, every inch of the garden plot must be made to count.

JUNE 14 VI

By the middle of June, most of the garden work has been done. The record shows that only twenty-four more hours' work is necessary before the end of the season. The pea vines, having reached their maximum growth, will soon fall over, shading the ground and conserving moisture. Healthy beets (this is the *prior* crop) indicate a properly limed and fertilized soil.

JULY 5

VII

The beans have just started to bear and the tomatoes, now 3 feet high, are growing vigorously. Trained to the poles for support, only one stem is kept for the bearing of fruit. By removing the lower branches and leaves, the shading of lower-growing crops is avoided.

AUGUST 14 VIII

All this for something over twenty dollars. The garden is at its height — corn twice a day, plenty of beets, carrots, beans, and tomatoes. The growth is luxuriant, in spite of the fact that the garden has not had a drop of artificial water. Nineteen-forty-two was a summer of normal rainfall.

AUGUST 14 IX

Four people were well fed from this garden. Observe the corn just visible in the beet row. When the beets have been pulled, the corn will take over as a *main* crop, and begin bearing in September. In this row there will obviously be no *follow* crop.

AUGUST 23

X

The late corn is not as thick as the early corn, but satisfactorily extends the season. Now there is no room for a weed, nor a square foot of bare ground, parched and baking. Peat moss and natural shade are both utilized to conserve moisture.

SEPTEMBER 5 XI

Avoid this mistake. The corn could not grow through the carrots because the carrots were planted too early and the corn too late. The timing, not the grouping, was at fault. Note the well-formed bean-pods at the extreme right.

SEPTEMBER 13 XII

More fruit and fewer leaves, as the season approaches harvest-time. See how the tomatoes and climbing Limas are widely spaced so as not to throw too much shade. The principal occupation now is picking, eating, canning, and preserving. Waste is not tolerated and the dividends are beginning to pay.

SEPTEMBER 30 XIII

As the *prior* crops yielded to the *main* crops, so do the *main* crops yield to the *follow* crops. Brussels sprouts stand the frost well and produce until late November. Parsnips, beets, carrots, and late spinach all replenish the fall table.

OCTOBER 15 XIV

There has been a general clean-up after the first killing frost, and only *follow* crops are left. This is the fall garden. The turnips, which should now be ready, failed for want of sufficient light. They will be used to advantage, however, in a mixed vegetable soup.

NOVEMBER 25 XV

The garden has been manured and the ground turned over. Boards have been placed along the edges. The rows have been measured off and marked. The garden is now ready for next year. In the spring all that remains to be done is to fertilize, set in the poles, and start planting, according to schedule.

PART

II

PLANS FOR THE 1943 GARDEN

PART

II

PLANS FOR THE 1943 GARDEN
25′ x 50′

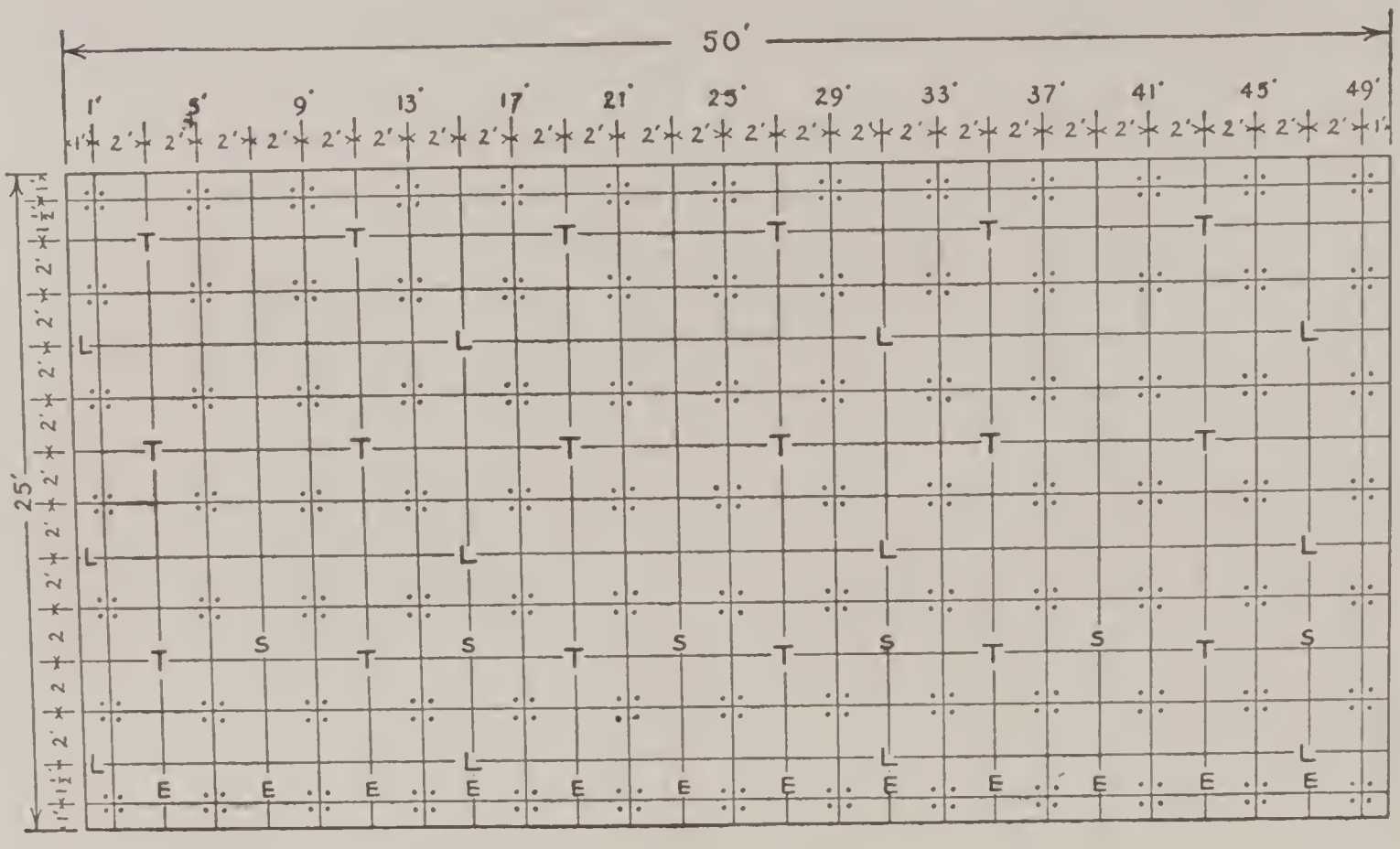
If you do have a garden, don't make it larger than you have time for. Adjust the garden size to your available time, and also to the size of your family. A garden twenty-five by fifty feet will provide fresh vegetables for four people. For three people, make it twenty-five by forty feet; and for two, make it twenty-five by thirty feet.

Above all things, pick a good and sunny location.

50′

Plant row with Potatoes			Follow with Spinach		and	13 Hills of Corn	spaced	4′	apart
"	"	" Beans	"	" Beans		6 Pole Tomatoes	"	8′	"
"	"	" Carrots				13 Hills of Corn	"	4′	"
"	"	" Parsnips				4 Pole Limas	"	16′	"
"	"	" Beets				13 Hills of Corn	"	4′	"
"	"	" Peas				6 Pole Tomatoes	"	8′	"
25′ "	"	" Beans	"	" Beans		13 Hills of Corn	"	4′	"
"	"	" Peas	"	" Beans		4 Pole Limas	"	16′	"
"	"	" Lettuce				13 Hills of Corn	"	4′	"
"	"	" Peas	"	" Sprouts		6 Pole Tomatoes	"	8′	"
"	"	" Onions	"	" Beets		13 Hills of Corn	"	4′	"
"	"	" Peas	"	" Carrots		4 Pole Limas	"	16′	"
"	"	Spinach follow with N.Z. Spinach and 13 Hills of Corn spaced 4′ and 12 Eggplant							

Plant follow crop rows 6″ from main crop rows.



PRIOR CROP	MAIN CROPS	FOLLOW CROP
Potatoes	Corn	Spinach
	Beans Tomatoes	Beans
Carrots	Corn	
	Parsnips Limas	
Beets	Corn	
	Peas Tomatoes	Beans
Beans	Corn	Beans
	Peas Limas	Beans
Lettuce	Corn	
	Peas Tomatoes	Sprouts
Onions	Corn	Beets
	Peas Limas	Carrots
Spinach	Corn	Eggplant N.Z.Spinach

:: Corn	7 Rows	13 Hills	= 91 Hills
L Limas	3 "	4 "	= 12 "
T Tomatoes	3 "	6 "	= 18 "
E Eggplant	1 "	12 "	= 12 "
S Brussels sprouts	1 "	6 "	= 6 "

Plant follow crop rows 6 inches to one side of main crop rows.

EXPECTED DATES

PRIOR CROPS		BEAR		MAIN CROPS		BEAR				BEAR		FOLLOW CROPS		BEAR	
	Plant	Begin	Finish		Plant	Begin	Finish		Plant	Begin	Finish		Plant	Begin	Finish
Potatoes	May 1	July 1	Aug. 1	Corn	June 20	Sept. 13	Sept 25					Spinach	Aug 1	Sept. 15	Oct. 1
				Beans	May 15	July 10	July 25	Tomatoes	June 1	July 10	Oct. 14	Beans	Aug. 1	Sept. 15	Oct. 1
Carrots	April 1	June 20	Aug. 20	Corn	June 13	Sept. 10	Sept 20								
				Parsnips	April 15	Oct. 1	Nov 1	Limas	June 1	Aug. 25	Oct. 14				
Beets	April 1	June 10	Aug 15	Corn	June 10	Sept. 1	Sept. 8								
				Peas	April 16	July 1	July 8	Tomatoes	June 1	July 10	Oct. 14	Beans	July 1	Aug. 15	Sept. 1
Beans	April 20	July 1	July 15	Corn	June 2	Aug. 22	Sept. 1					Beans	July 15	Sept. 1	Sept. 15
				Peas	April 8	June 26	July 3	Limas	May 15	Aug. 20	Oct. 14	Beans	June 15	Aug. 1	Sept. 1
Lettuce	May 1	June 14	Aug. 1	Corn	May 20	Aug. 14	Aug. 21								
				Peas	Mar. 28	June 18	June 24	Tomatoes	June 1	July 10	Oct. 14	Sprouts	June 1	Oct. 1	Nov. 15
Onions	April 1	June 1	June 25	Corn	May 12	Aug. 8	Aug. 15					Beets	June 25	Aug. 15	Oct. 14
				Peas	Mar. 28	June 18	June 24	Limas	May 15	Aug. 20	Oct. 7	Carrots	June 25	Aug. 20	Oct. 14
Spinach	April 1	May 23	June 10	Corn	May 1	Aug. 1	Aug. 10					Eggplant	June 1	Aug. 1	Oct. 14
												N.Z. Spinach	June 11	Sept. 1	Oct. 14

The dates given are for planting the seeds or transplanting the plants. See following page for dates on which to plant the seeds which are to be started in a greenhouse.

Planting Schedule for Garden

	March	28		Peas
	April	1		Beets
	"	1		Carrots
	"	1		Onion, sets
	"	1		Spinach
	"	8		Peas
	"	15		Parsnips
	"	16		Peas
	"	20		Beans
	May	1		Corn
Sow in greenhouse March 13	"	1	Transplant	Lettuce
	"	1		Potatoes
	"	12		Corn
	"	15		Sievas
	"	15		Beans
Sow in greenhouse April 12	"	16	Transplant	Lettuce
	"	20		Corn
	June	1		Sievas
Sow in greenhouse March 1	"	1	Transplant	Tomatoes
" " " April 15	"	1	"	Brussels sprouts
" " " March 1	"	1	"	Eggplant
	"	2		Corn
	"	10		Corn
Sow in greenhouse April 15	"	11	Transplant	Spinach, New Zealand
	"	15		Beans
	"	15		Corn
	"	20		Corn
Sow in greenhouse May 10	"	24	Transplant	Lettuce
	"	25		Beets
	"	25		Carrots
	July	1		Beans
	"	15		Beans
	August	1		Beans
		1		Spinach

If you do not have a greenhouse, buy the seeds and arrange with a greenhouse grower to grow them for you, or else buy the plants. If you wish to buy the plants, make the arrangements early, for the plants named are not usually carried by the seed houses although the seeds are.

Seed List

Vegetable	Amount	Variety
Beans, bush	3 lb.	Stringless Greenpod
Beets	¼ lb.	Harvard
Brussels sprouts	1 pkt.	Catskill
Carrot	½ oz.	Golden Beauty
Corn	¾ lb.	Golden Bantam, Massachusetts grown
Eggplant	1 pkt.	Early Long Purple
Lettuce	1 pkt.	May King
Lettuce	1 pkt.	Imperial Number 44
Lima, pole	½ lb.	Sieva
Onion, sets	1 lb.	Yellow Globe
Parsnips	½ oz.	Hollow Crown
Peas	4 lbs.	Little Marvel
Potato	½ pk.	Irish Cobbler
Spinach	2 oz.	Bloomsdale Savoy
Spinach	1 oz.	New Zealand
Tomato	1 pkt.	Rutgers

If Little Marvel peas are not obtainable because of Government regulations, try Nott's Excelsior and Laxton's Progress and pick the better for the following year.

Plants Required

If not raised from the above seed, buy:

Brussels sprouts	6
Eggplant	12
Lettuce	40
Tomatoes	18

Fertilizer Required

½ cord well-rotted manure
50 lbs. of fertilizer 7–12–10 with the nitrogen in organic form (or if that is not possible, then 100 lbs. of 3–8–7)
Broadcast and raked in before planting — 45 lbs.
Work in bottom of pea and potato trenches, before planting 5 lbs.

Poles Required

30 9 feet long — set 2 feet in ground
1 bale peat moss

Sprays Required

1 pint Greentox or New Evergreen
2 lbs. rotenone dust
4 lbs. Snarol

STARTING THE GARDEN

If you finally decide to have a garden, then get busy as soon as possible, be it spring, summer, or fall. Don't delay.

1. The garden plan looks complicated, but the conception of it can be simplified if you will remember that you are growing three crops in the pea rows and three crops in the corn rows, and what is more, you are growing each of these rows in a space ordinarily used for either the peas or the corn. Or, you are growing six crops where ordinarily you would grow only two. In this way you achieve very intensive cultivation and obtain more pounds of vegetables per square foot than from the accepted and usual garden plan.

All things considered, it seems better to lay out the garden east and west, although it will work laid out in any direction. Above all things the most important is to pick out a sunny location. Avoid tree roots, shade, swamp, and poor soil.

2. Order your supplies, seed, fertilizer, tools, and hose if you have water available. Watering is advisable but not essential in average weather. The garden herein described had no watering except that which was provided by a normal rainfall.

3. Try to have these all done and your supplies on hand so that you can be certain of starting planting on the date scheduled, March 28. Keep a record of what you do on the pages for that purpose in this book — the seeds ordered, the amounts and costs, from whom bought, etc., so that you can always refer to them later. Keep notes on your work. Read garden books; there are many excellent ones. Read your state publications on home gardening. Write your County Agent or State Agricultural College for a list of available material. Subscribe to a good garden magazine. Read seed catalogues, but be a little skeptical of the claims. Visit gardens and talk with the gardeners. They will gladly help you.

4. Don't change the plan or varieties. Each one was selected for its purpose. After the first year, try anything, but if you do, try it on a small scale in case it is unsuccessful.

5. Stake out your garden, making sure that the plot is a rectangle. If

you don't, your rows will not come out right and you will always regret it. Use pieces of one-inch pipe eighteen inches long for each corner.

6. If possible, hire a roto tiller and the man to run it, particularly if the garden is laid out on a grass-covered plot; otherwise, the work will be hard. If you can't hire a roto tiller, then hire a horse plow.

7. Then lay out the pea and corn rows and mark each row with a substantial marker; either a piece of pipe one inch in diameter and eighteen inches long or a solid stick creosoted or painted. It is worth while taking a little trouble to do this properly as it will save time during the busy planting season.

8. After plowing, spread and disk-harrow in the manure.

9. If possible, edge the garden with boards 4 by 1 inches creosoted or painted. This is for appearance only.

10. In the spring after liming and fertilizing, rake the garden plots smooth and then set firmly at least two inches deep the poles for the tomatoes and limas.

Insecticides

11. Starting June 1–15:

Dust the beans and Sievas every ten days for bean beetle with rotenone dust when the foliage is wet with dew, or this may be mixed with water and sprayed or Greentox can be used and sprayed on.

Starting June 1–15:

Spray the potatoes and eggplants every seven days for potato bug with Greentox or New Evergreen.

Starting June 1–15:

For cutworms sprinkle Snarol around the base of the Brussels sprouts plants and repeat as necessary. For cabbage worms, spray Greentox weekly.

The actual time spent in 1942 in applying insecticides was two periods of ten minutes each, both for the potato bugs. This small amount of time needed may be due to the fact that no garden had been grown in this area for some time.

Humus

12. Use manure if possible, with leaf mold as second choice. Manure should be spread on the garden in the early spring or in the late fall if

possible and dug in. The ground is then made smooth and left until planting time.

If manure is used, it will require a half-cord, or sixty-four cubic feet or three thousand pounds, of as well-rotted manure as you can find. If possible, get horse manure, as it is better than cow manure, but don't get any with shavings in it. This will be at the rate of twenty square feet of garden area for one cubic foot of manure. When the garden is once established, the manure should be bought ahead of requirements and treated with phosphate and kept moist for one year at least.

13. If manure is not available, leaf mold would be its equivalent if properly prepared. If leaf mold is used, it will require four tenths of a cord or fifty cubic feet or approximately fifteen hundred pounds. This will be at the rate of twenty-five square feet of garden area for one cubic foot of leaf mold. This, however, requires one and a half years to prepare. One method of preparing it which has been found extremely satisfactory is to make three bins of creosoted boards each about seven feet square and four inches high. The first year one bin only is filled with leaves. While being put in, these should be wet thoroughly and 100 pounds of 5–8–7 fertilizer and twenty-five pounds of ground limestone (not hydrated) should be mixed with them throughout the pile. They should be tramped down and made as solid as possible. When the bin is full, a little loam can be spread over the top and wetted down. This will prevent the leaves from blowing. Next spring and again in the fall and the following spring, the bed should be turned over, each time watering thoroughly and adding a little fertilizer and ground limestone. In one and a half years the bed will be about one fourth of its original size and the leaf mold will be reduced to a powder, than which there is nothing better for the lawns or garden. This will supply enough humus for the garden. It can then be used, although it is better to keep it another year.

In the fall of the second year the other outside bin of the three is filled with leaves.

The third fall the contents of the first bin is thrown over into the middle bin, where it is mixed with loam and fertilizer and made ready for the garden and lawns. The space of the first bin is then ready to be filled with leaves once more.

See Leaflet Number 155, 'Compost For the Home Garden,' by Arnold M. Davis, Division of Horticulture, Massachusetts State College. This is excellent and gives the whole story.

Peat Moss

14. It is advisable to use peat moss as a soil covering for the following reasons:

1. It protects the soil from baking due to the hot sun.
2. It conserves moisture in the ground by acting as an insulating material.
3. It soaks up rain like a sponge.
4. It reduces weeds to a minimum. What few weeds do grow in the peat moss are very easy to pick out. The roots come out whole and do not break off. It is well worth while using.

As soon as the plants in any row have grown about two inches high above ground, do the necessary thinning out and then spread the peat moss evenly about one half-inch thick. This will take about one bale of peat moss for the twenty-five-by-fifty-foot garden. Inasmuch as the rows grow up one after the other, the peat moss cannot be spread over the whole garden at once. It will take about four applications as the different rows reach the required heights.

15. Rabbits are very fond of baby beans and Brussels sprouts. If there are any around, it is well worth while to build a fence of chicken wire eighteen inches high around the garden. This can be supported by a few small posts. It is an easy and cheap way to avoid loss.

VARIETIES

Beans, *Stringless, Green Pod*

The finest bean grown. It is so good it should be served as hot as possible on toast as a separate course. This was selected as the best after trying sixteen varieties over a period of many years.

Five plantings are made — the first April 20 and the last August 7. This will give plenty to eat all summer and leave some for canning.

Beets, *Harvard*

These were selected as being the sweetest after comparative tests of many varieties of beets. Two plantings are made.

CARROTS, *Golden Beauty*

These were selected as being the sweetest and having the least core. Particularly good when picked very young. They are even delicious when shredded and eaten raw in a salad. Both beets and carrots can be left in the ground until just after freezing. Two plantings are made.

CORN, *Golden Bantam, Massachusetts Grown*

This is the best of all vegetables to grow, with a long season from July 20 to the first frosts about October 7. The special strain recommended was selected after tests on eighteen varieties over a period of many years. It has been almost free from disease of any kind. The only thing that has ever bothered it has been the squirrels, who try to walk off with whole ears. Seven plantings are made.

There are three reasons for the better quality of this corn in comparison with the ordinary market corn:

1. The varieties usually grown by the truck farmers are nowhere near the equal of this particular variety.

2. Market corn is generally picked before or after it is ripe because of either crop or market conditions, so that of any given corn sold to the market, the whole of it is never just in the right condition.

3. Because of the time lost in taking it to market and delivering it, it is seldom less than thirty-six hours old. Corn deteriorates faster than any other vegetable and should be eaten within a few hours. It is really better if you run out and pick it just before you cook it.

In the corn rows plant the prior crops, and then when it is time to plant the corn, mark out the hills six inches square. At each corner plant one corn seed. This way, two seeds of corn will grow on one side of the prior crop and two on the other side. As soon as the prior crops are finished, the following crops are planted in their places without disturbing the corn hills. The hills are spaced 4 feet apart in the row. This is far enough apart so that no damage is caused by the shadows of the cornstalks.

EGGPLANT, *Early Long Purple*

Selected because of its flavor and also because it is small in diameter, so that slices will fit on a dinner plate without cutting up. The plant should be tied to sticks to support the weight of the fruit.

Lettuce, *May King*

Excellent quality for spring.

Imperial Number 44 will give good heads all summer without going to seed.

Limas, *Sieva*

These were selected because they are very productive, small, and of high quality. They will bear right up to frost. Should be cooked in a pressure cooker in two minutes.

Parsnips

Should be kept in the garden and not used until after frosts. Delicious if cooked the same way as Julienne potatoes.

Peas

The Little Marvel was selected because it is a very dwarfed pea, growing not over fifteen inches high. Bush or other supports are not needed and should not be used. The vines fall over of their own accord, so that they do not shade the plants growing on each side. While its quality is good, it is not of the best, but all things considered, it is the most suitable pea for this garden. If not available, use Nott's Excelsior or Laxton's Progress.

Four plantings are made, giving a picking season from June 18 until July 8. The peas should be planted to within one foot of the poles for the tomatoes and Limas. This space must be left to allow the tomato and Lima plants to grow.

Tomatoes

The Rutgers is the finest variety yet tried. It is even in size and color with very few cracks and is very productive. No other variety so far tested has equaled it in taste and texture.

Brussels Sprouts, *Catskills*

These are small in size but are of excellent quality. They can be left standing in the garden long after frost and the buttons picked until used. Each plant should produce about two pounds. Particularly good if cooked in a shallow casserole, au gratin. Tie plants to stakes; otherwise, they will fall over. It is advisable to use an insecticide for cutworms when the plants are young. Above all, protect the young plants from rabbits.

PART

III

RECORDS TO BE KEPT

ACTUAL DATES

PRIOR CROPS		BEAR		MAIN CROPS		BEAR				BEAR		FOLLOW CROPS		BEAR	
	Plant	Begin	Finish		Plant	Begin	Finish		Plant	Begin	Finish		Plant	Begin	Finish
Potatoes				Corn								Spinach			
				Beans				Tomatoes				Beans			
Carrots				Corn											
				Parsnips				Limas							
Beets				Corn											
				Peas				Tomatoes				Beans			
Beans				Corn								Beans			
				Peas				Limas				Beans			
Lettuce				Corn											
				Peas				Tomatoes				Sprouts			
Onions				Corn								Beets			
				Peas				Limas				Carrots			
Spinach				Corn								Eggplant N.Z. Spinach			

Hours Worked

	NOV.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.
1										
2										
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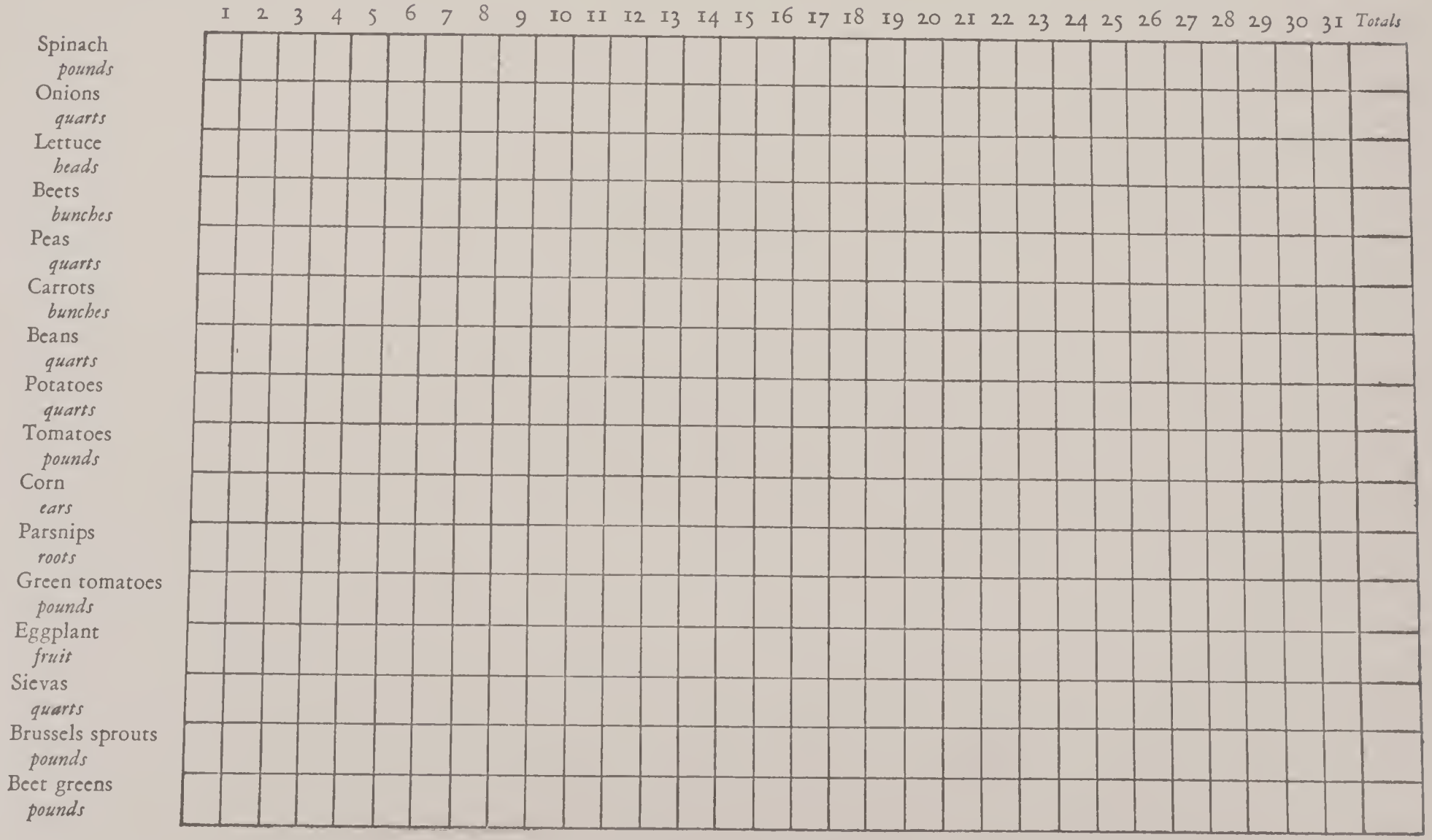
ACTUAL YIELD, MONTH OF MAY



ACTUAL YIELD, MONTH OF JUNE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	*Totals*
Spinach *pounds*																																
Onions *quarts*																																
Lettuce *heads*																																
Beets *bunches*																																
Peas *quarts*																																
Carrots *bunches*																																
Beans *quarts*																																
Potatoes *quarts*																																
Tomatoes *pounds*																																
Corn *ears*																																
Parsnips *roots*																																
Green tomatoes *pounds*																																
Eggplant *fruit*																																
Sievas *quarts*																																
Brussels sprouts *pounds*																																
Beet greens *pounds*																																

ACTUAL YIELD, MONTH OF JULY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	*Totals*
Spinach *pounds*																																
Onions *quarts*																																
Lettuce *heads*																																
Beets *bunches*																																
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Corn *ears*																																
Parsnips *roots*																																
Green tomatoes *pounds*																																
Eggplant *fruit*																																
Sievas *quarts*																																
Brussels sprouts *pounds*																																
Beet greens *pounds*																																

ACTUAL YIELD, MONTH OF AUGUST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	*Totals*
Spinach *pounds*																																
Onions *quarts*																																
Lettuce *heads*																																
Beets *bunches*																																
Peas *quarts*																																
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Beans *quarts*																																
Potatoes *quarts*																																
Tomatoes *pounds*																																
Corn *ears*																																
Parsnips *roots*																																
Green tomatoes *pounds*																																
Eggplant *fruit*																																
Sievas *quarts*																																
Brussels sprouts *pounds*																																
Beet greens *pounds*																																

ACTUAL YIELD, MONTH OF SEPTEMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	*Totals*
Spinach *pounds*																																
Onions *quarts*																																
Lettuce *heads*																																
Beets *bunches*																																
Peas *quarts*																																
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Beans *quarts*																																
Potatoes *quarts*																																
Tomatoes *pounds*																																
Corn *ears*																																
Parsnips *roots*																																
Green tomatoes *pounds*																																
Eggplant *fruit*																																
Sievas *quarts*																																
Brussels sprouts *pounds*																																
Beet greens *pounds*																																

ACTUAL YIELD, MONTH OF OCTOBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	*Totals*
Spinach *pounds*																																
Onions *quarts*																																
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Corn *ears*																																
Parsnips *roots*																																
Green tomatoes *pounds*																																
Eggplant *fruit*																																
Sievas *quarts*																																
Brussels sprouts *pounds*																																
Beet greens *pounds*																																

Request for Information

The author would like to hear from those who follow the plans as given and would appreciate the following information with the idea of issuing revised and improved plans in the future. Information on all or any of the following points would be of the greatest interest:

In what town is garden located?

Description of soil.

Size of garden.

Hours worked per month.

What change if any in seed list or fertilizer.

For how many people could your garden provide?

Amount in quarts, pounds, or heads of vegetables produced.

What improvements could be made in directions or plans?

What criticism can you make of garden or plans?

Was garden good?
fair?
poor?

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